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Design and Construction of Roof and Wall Trusses.

IV. THE "A" TYPE OF TRUSS.

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THE simplest form of the "A" truss is the combination of two rafters and a collar beam as shown in Fig. 93. If the supports A and B are immovable, the stresses in the members of the truss, which are produced by symmetrical vertical loading, are readily found by the usual methods. The graphical determination of the stresses is illustrated in Figs. 94 and 94a. All members are in compression and there are no bending stresses other than the secondary stresses, which are common to all trusses having more or less rigid connections at the joints.

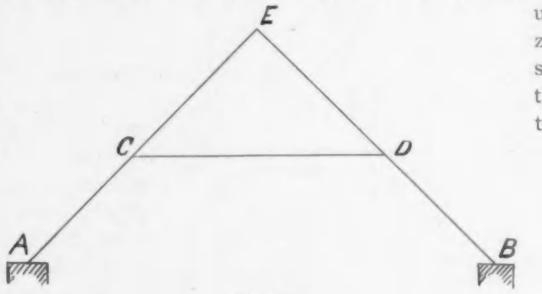


Fig. 93

In case the loading is not symmetrical, the problem is not as simple. Assuming that the connections at A and B (Fig. 93) are pins (fixed connections, usually, are not feasible in buildings), it is evident that the connections at joints C and D (Fig. 93) cannot be made with pins, since the four-sided figure ACDB would collapse under an unsymmetrical load. If, however, the rafters are made continuous from A to E, and from B to E, a pin may be used at E and the collar beam connected by pins at C and D. The structure is now stable and, strictly, is a two-hinged arch if the relative positions of A and B remain unchanged. While the elastic theory of the two-hinged arch can be readily applied in this case, it is probable that the following method will be found to be easier and sufficiently exact for practical purposes.

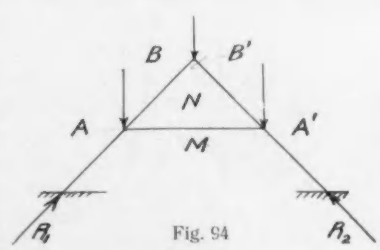


Fig. 94

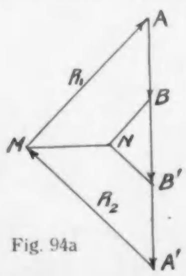


Fig. 94a

The case of unsymmetrical loading is usually due to the action of the wind on the roof. Such loads can always be represented by vertical and horizontal components, as indicated in Fig. 95.

Two equal and symmetrically placed loads on a symmetrical two-hinged arch produce a horizontal thrust at each support which is twice that produced by either one of the loads alone. Then it may be assumed for the vertical components V_1 and V_2 (Fig. 95) that the thrust at each support is

$$H_1 = H_2 = \frac{1}{2}\left(V_1 \frac{a}{b} + V_2 \frac{L}{2f}\right). \tag{1}$$

Owing to the symmetry of the frame in every particular, the thrusts due to the horizontal components may be considered as equal and each having the magnitude of one-half the total horizontal loading.

Then,

$$h_1 = -h_2 = \frac{1}{2}\left(Q_1 + Q_2\right). \tag{2}$$

The vertical reactions are precisely the same as for a simple truss on two supports. Therefore, the following is derived:

$$R_1 = \frac{1}{L}\left(V_1(L-a) + V_2 \frac{L}{2}\right) \tag{3}$$

$$R_2 = \frac{1}{L}\left(V_1 a + V_2 \frac{L}{2}\right) \tag{4}$$

$$-r_1 = +r_2 = \frac{1}{L}\left(Q_1 b + Q_2 f\right). \tag{5}$$

To illustrate the application of this method, take the truss shown in Fig. 96, and, for convenience, assume the normal wind loads to be 1,414 and 707 pounds, as indicated in the figure by their vertical and horizontal components.

The horizontal thrusts are

$$H_A = H_1 - h_1 = \frac{1}{2}\left\{1{,}000\,(10)/(10) + 500\,(40)/(40) - (1{,}000 + 500)\right\} = 0,$$

$$H_B = H_2 + h_2 = \frac{1}{2}\left\{1{,}000(10)/(10) + 500(40)/(40) + (1{,}000 + 500)\right\} = 1{,}500.$$

The vertical reactions are

$$R_A = R_1 + r_1 = 1{,}000 - 500 = +500,$$

$$R_B = R_2 + r_2 = 500 + 500 = 1{,}000.$$

The stresses in the members are best found by moments and the resolution of forces.

At A the reaction 500 is resolved into two components, one parallel to AC, and the other normal to AC, as indicated by the dotted lines. The direct stress in AC equals 500 cos θ, or 354 pounds compression.

In a like manner the two forces at B are resolved and the stress in BD found to be 1,767 pounds compression.

The stress in CD is found by cutting the frame through CE and CD and taking E as a center of moments. (See Fig. 96a.)

Stress CD (10) = —1,000 (10) — 1,000(10) + 708 (14.14) or the stress in CD is 1,000 pounds compression.

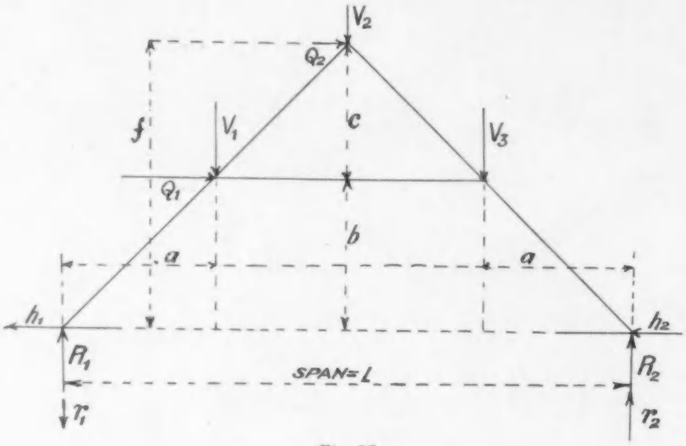


Fig. 95

Using the same section and taking D as a center of moments, the stress in CE is found to be 354 pounds tension. In a similar manner the stress in DE is found to be 1,060 pounds compression. This disposes of all of the *direct* stresses in the truss members.

The rafters AE and BE are each subjected to bending moments produced by the normal components of the reactions. These moments are zero at A, E and B and maximums at C and D. The moments at C and D are each equal to

$$500\ (10)\ (12) = 60{,}000 \text{ inch-pounds,}$$

$$\text{or} - 1{,}000\ (10)\ (12) + 1{,}500\ (10)\ (12) = 60{,}000 \text{ inch-pounds.}$$

To further illustrate the determination of the stresses and bending moments in the "A" truss when the supporting walls are assumed to be capable of resisting the horizontal thrusts at A and B (Fig. 97), assume that the trusses are spaced 10 feet on centers and have the dimensions shown in Fig. 97. Let the roof covering be slate on heavy sheathing and the rafters, purlins, and truss members be of long-leaf southern pine. The apex loads, due to the weight of material and snow retained by snow guards, will be about 4,000 pounds at each apex. The normal wind load* is assumed to be about 1,900 pounds at C and 950 pounds at E.

The stresses produced by the vertical loads of 4,000 pounds at each apex are found from a stress diagram similar to that shown in Fig. 94a, and the stresses due to the wind forces are found in the manner just given. All of these stresses are shown in Fig. 98.

Inspection shows that the maximum stress in the rafters is 10,875 pounds compression, and that the bending moment is 56,448 inch-pounds. It is sufficiently exact to design the rafter so that the sum of the unit stress in compression and that for cross bending does not exceed the *allowable* unit stress in compression.

If the least dimension of BD is 7½ inches, L/d = (9.9) (12)/(7.5) = 16 (nearly), a slenderness ratio which corresponds to an allowable unit stress in compression of about 1,000 pounds per square inch.

Assuming the depth of the rafter to be 7½ inches, the extreme fiber stress due to the bending moment is

$$\frac{(6)\ (56{,}448)}{(7.5)\ (7.5)\ (7.5)} = 803 \text{ pounds per square inch.}$$

The stress per square inch due to the direct stress is

$$10{,}875/(7.5)\ (7.5) = 193 \text{ pounds.}$$

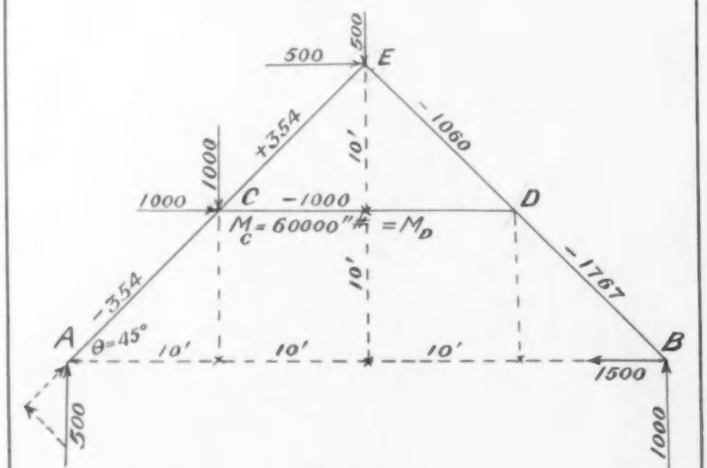


Fig. 96

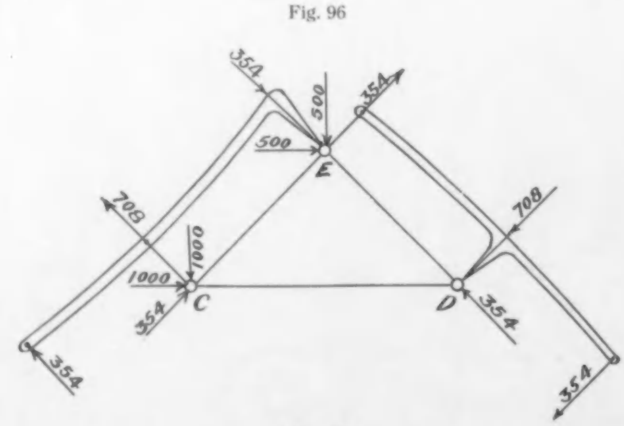


Fig. 96a

* Two valuable articles by R. Fleming, American Bridge Company on Wind Pressure Formulæ and their application to roof trusses, are published in *The Engineering News*, Jan. 28, 1915, and Feb. 4, 1915.

The sum of these two unit stresses is $803 + 193 = 996$ pounds, which does not exceed the allowable unit stress found above.

As far as the direct stresses and bending moments are concerned, the rafters can be made of timbers 7½ by 7½ inches, but this allows nothing for the necessary cutting to make the collar beam connections. Therefore the rafters should be 7½ by 9½ inches (8 by 10 inches nominal).

The collar beam, on account of its length, should be at least 7½ by 7½ inches.

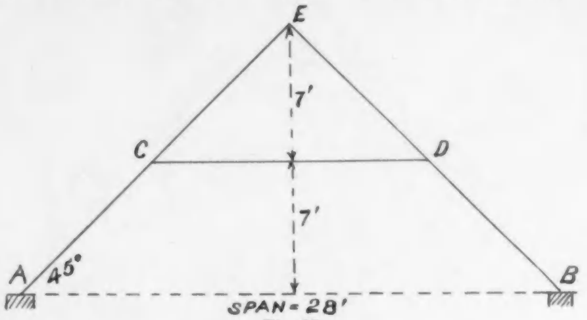


Fig. 97

If the connections at C and D are reinforced above and below by solid knee braces, the bending stresses in the rafters proper will be reduced, but the collar beam will be subjected to bending stresses.

If in addition to the knee braces the connection at E is made as rigid as possible, and the collar beam made at least as large as the rafters, the truss will have ample strength and stiffness.

In case it is desired to relieve the supporting walls as much as possible from horizontal forces, some means must be provided for taking care of the horizontal forces.

The horizontal thrust due to the wind must, of course, be taken by one or both walls.

The horizontal thrusts produced by the dead load (4,000 pounds at each apex) can be provided for by making the rafters sufficiently strong and stiff so as to prevent the points A and B from separating any great amount due to the changes of length of the truss members and the bending of the rafters.

The simplest way to consider this case is to assume a hinge at A and rollers at B as shown in Fig. 99.

The reactions at B are vertical and have the same magnitudes as found for Fig. 98 at B. The vertical reactions at A are the same as in Fig. 98, but the entire horizontal component of the wind is resisted here. Owing to the shape of this particular truss and the disposition of the wind loads, the horizontal thrust in this case happens to be the same as given in Fig. 98.

Fig. 99 shows the loading, reactions and stresses to be considered. The direct stresses in the rafters may be neglected, as the bending moment at C is so large. This moment is,

$$8{,}687\ (7)\ (12) = 729{,}700 \text{ inch-pounds.}$$

A timber 11½ by 17½ inches is required with a fiber stress of about 1,300 pounds per square inch.

The collar beam is now in tension and its stress is about 10,700 pounds.

Assuming that the collar beam is made so heavy that its change in length can be neglected, and that the rafters are free to bend throughout their length, the change of span between A and B produced by the bending of the rafters can be found from the expression (see Fig. 99),

$$d = \frac{M_C + M_D}{3EI \sin \theta}\,(b^2 + bc),$$

where M_C is the bending moment at C and M_D that at D, E Young's modulus of elasticity, and I the moment of inertia of the cross-section of the rafter, with reference to an axis normal to the plane of bending.

Inserting numerical values in the above expression,

$$d = \frac{1{,}346{,}600}{3(1{,}500{,}000)(5{,}136)(.707)}\left(84^2 + (84)\ (84)\right) = 1.16 \text{ inches.}$$

Under a full load the change in span will probably be larger than the above quantity, owing to the stretching of the collar beam and the give in the connections at C, D and E.

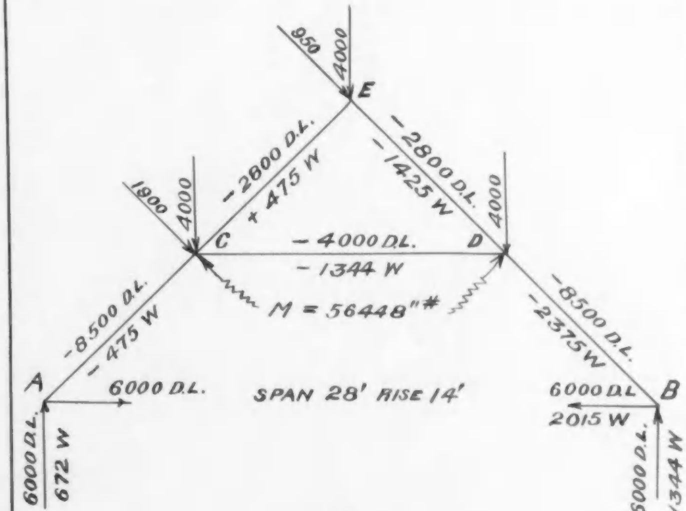


Fig. 98

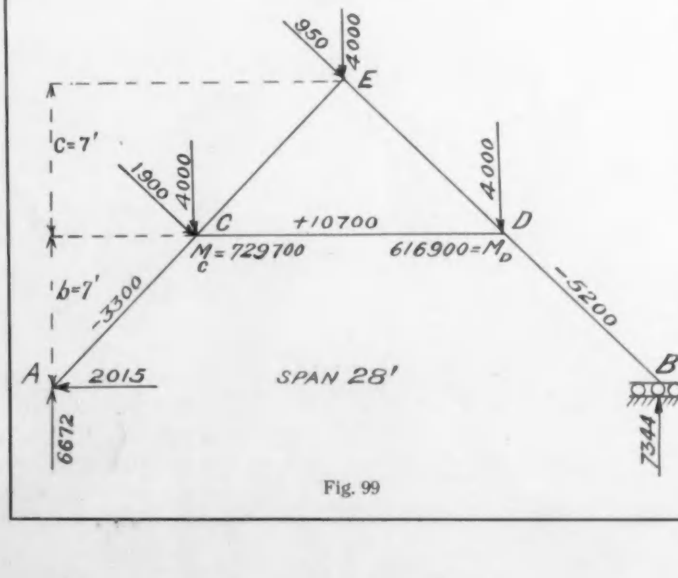


Fig. 99

The "A" truss should be framed with the span a little short to allow for the horizontal deflection of the supporting ends. One end of the truss can be placed in its proper position on its supporting wall, but the other end should be given freedom to slide outward on its support as the roof loading is applied. Another method is to force the ends apart the amount of the horizontal deflection by a temporary strut. As the load comes on the truss, the stress in this strut will be relieved until finally it can be removed.

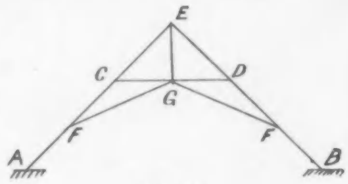


Fig. 100

The sizes of the rafters can be materially reduced by the introduction of bracing as shown in Fig. 100. As the points F approach A and B, the bending in the rafter grows smaller and smaller until finally, when the points F coincide with A and B, there is no bending in the rafters. There is, however, a horizontal thrust due to the wind forces and a change in span due to the changes of length of the individual members of the frame. A common form of this type of truss is called the scissors truss, which will be considered later.

Joint Connections for the "A" Truss. Where the rafters meet, the simplest connection is that shown in Fig. 101, which consists of a hardwood key and one or more bolts.

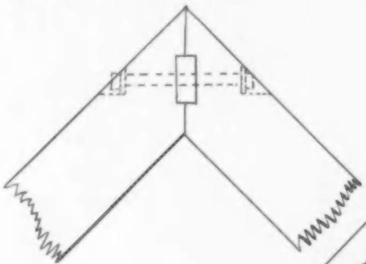


Fig. 101

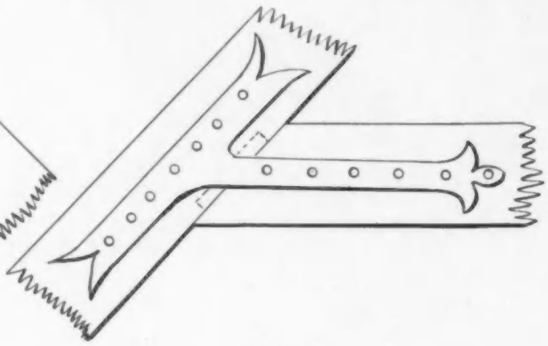
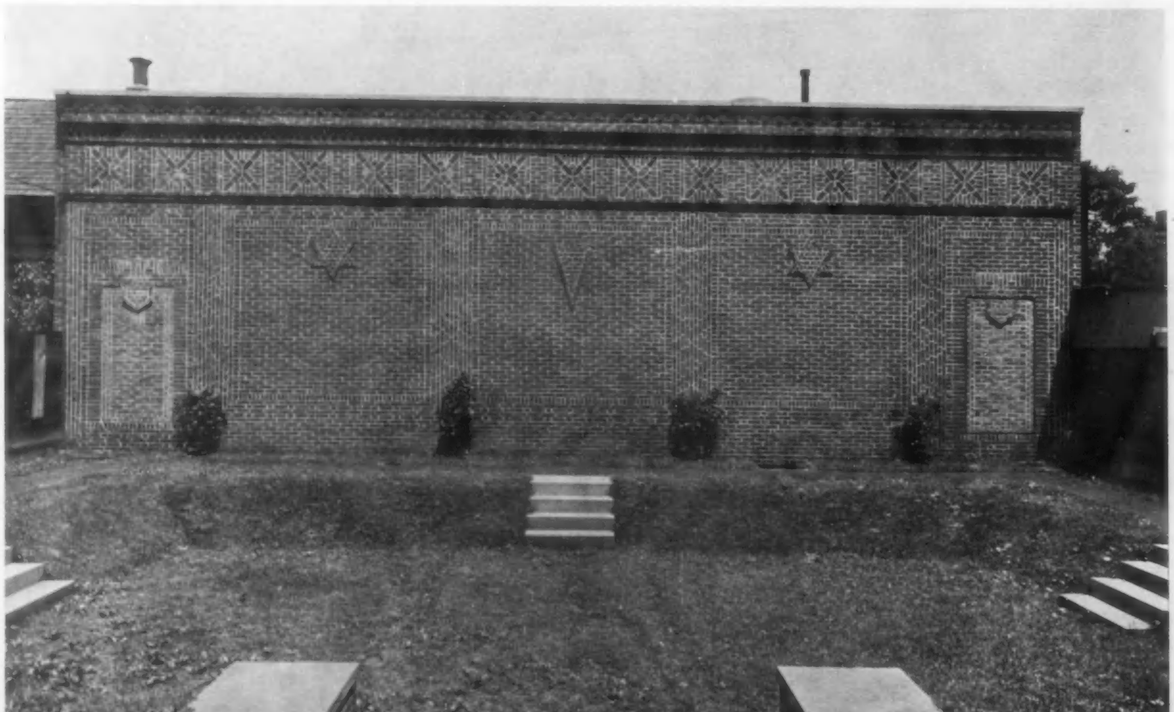


Fig. 102

The collar beam connection can be made in several ways, but the detail shown in Fig. 102 has the advantage of being simple and does not require any excessive cutting of the rafter. The collar beam has a tenon entering a *shallow* mortise in the rafter to keep it in place vertically. The wrought iron straps are attached with lag screws which are placed along the *center lines* of the pieces connected.



ORNAMENTAL BRICK GARDEN WALL

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Plumbing Installation and Sewage Disposal.

III. WATER SERVICE AND HOT WATER SUPPLY SYSTEM.

By CHARLES A. WHITTEMORE.

IN arranging for the water service pipes to be brought into a building, after the usual formalities of filing applications and other papers with the water department of the city or town, a deposit is usually required to cover the expense of the connection to the main in the street; the laying of the pipe from the street main through the wall of the building; and the installation, outside the wall of the building, of the necessary gate valves, or "cut-offs," by means of which the water supply to the building is controlled. It has been found from experience that in order to facilitate the service installation, the plumbers should be required to make the application in the name of the owner of the building, to make the deposit required by the city water department, and to be responsible to the owner and to the city for the proper installation of this work.

The city authorities, upon receiving an application, have the engineering department look over the conditions of the ground and the building, and determine the distance of their pipes from the building line. An estimate of the probable expense of installing this work, together with the probable expense of the material used, is then made, and this amount represents the deposit which the owner, or for him the plumber, is required to make. Upon the completion of the work, if the expense involved has not amounted to the estimated deposit, the balance is returned to the depositor. In case peculiar difficulties are encountered and the expense is more than the estimate, the owner or plumber is required to pay the amount in excess of the original deposit.

The general contractors should be required to do the digging in the street, obtaining the necessary permits for opening the street, and arrange for the preliminary work of the water department. This has been found to save considerable time and avoid delays in having the water brought into the building when desired.

The street connection with sewers and mains, etc., can be done only by licensed drain layers and men who are under a bond for opening the street. It is, therefore, of importance in arranging for any such work to be sure that the proper man is caring for this portion of the installation.

After the water pipes have been brought through the building wall, connections are left for the meters. These meters are the property of the city or town controlling the water supply and are installed by the water department unless special meters are used or special arrangements are made with the water department. In some of the smaller cities and towns where there is a large water supply, meters are not required; but in the main it is always advisable in writing specifications to note that the plumber is to arrange with the city for the meter installation, and that the plumber is to be responsible for all these connections.

There are two general types of meters used to indicate water consumption: one in which the amount of water is determined by the velocity of the water flowing through an orifice of a fixed size; the other by the amount of water contained in a chamber in the meter. In the former type the velocity per foot determines the amount of water used, the aperture being constant, and the amount of water passing through is automatically registered on a dial. In the other type the water chamber is continually filled and refilled, and thus the volume of water consumed is mechanically registered. There are several standard makes of meters on the market, but inasmuch as this particular phase of the plumbing installation is so seldom encountered it is hardly necessary to discuss these types.

When it is desirable to ascertain the exact amount of water consumed in connection with a mechanical plant so as to determine the cost of maintenance, meters of either of the above types are used.

As has been previously noted, the water in a large installation after having passed through the supply main and the meter is conducted to the cold water supply drum. From this drum the various rising lines are taken to supply different parts of the building. Each rising line should be tapped separately into the drum, and at the base of each rising line there should be a separate gate valve or other approved form of shut-off. All of these rising lines and valves should be tagged, and the number on the tag should be noted on an index which should be framed or attached to the wall near the drum, so that trouble in any portion of the building may be immediately localized and damage prevented by closing off the proper valve without depriving the remaining portion of the building of its normal supply of water.

At the base of each rising line branching from a main line in the basement a "draw-off" cock should be placed and either connected with the sewer or extended to a sink or drain so that it may be possible at any time to draw off the cold water from any portion of the building without inconvenience to any other portion.

Hot Water Supply System. The hot water supply system is a problem by itself, and much discussion has been aroused over the most perfect method of installation, so as to give hot water at all points without delay. An ideal system is one in which the temperature of the water at all points varies but slightly; in which the circulation is continuous and unobstructed; and in which the hot water is conducted directly to each faucet, so that hot water may be drawn as soon as the faucet is opened.

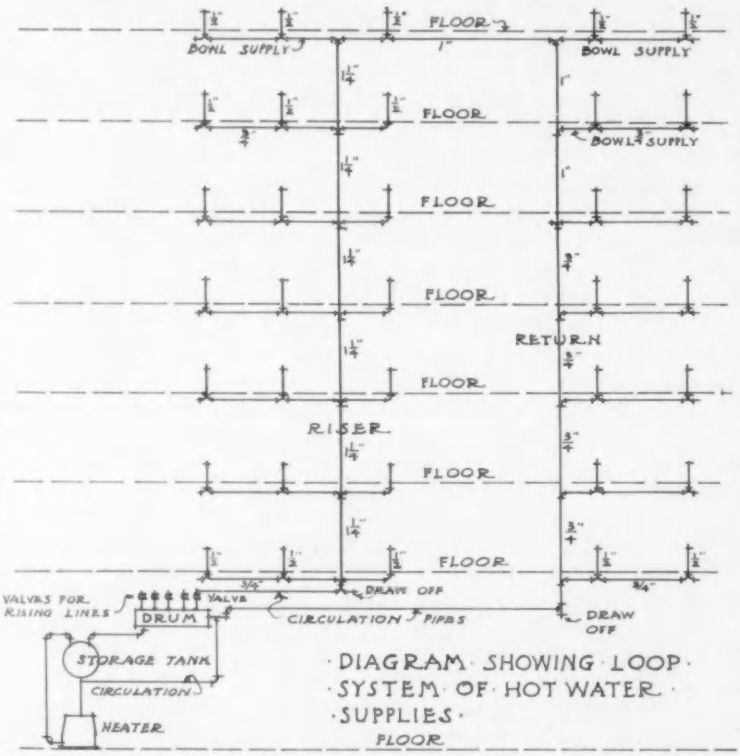
There are two general types of hot water installation,—one in which the circulation pipes are carried on the basement ceiling and from this circulation loops, forming the continuous circulation to the individual fixtures, are carried up through the building. From the rising side of the loop supplies to the various fixtures are taken, the size of the pipe being undiminished throughout its length. After reaching the highest point at which a relief valve should be installed to relieve the system of any air, vapor, or steam that might force its way in through the water,

the pipes are carried down to the main circulation pipe, gradually reducing in size, thus maintaining a constant circulation in this portion of the system by retarding the flow due to the head of water descending in the pipe.

In a building several stories in height, the circular loops are usually carried to the under side of the top floor, and the supply for the fixtures in the top floor are taken from the top of the loop. This supply acts as a relief valve, as whenever the faucets in the fixtures on the top story are open an opportunity for air to escape is easily afforded.

In the other system the main hot water supply lines are carried to a point preferably above the highest fixtures, circulating at this level around the building so as to supply the lines in various sections and returning by a similar pipe to the tank or heater or general storage supply. The various supply lines, which are taken from the circulation system at the high point, are extended through to the lowest point of the system and are there connected to the return from the circulation system.

Advantages are claimed for each system, but the consensus of opinion would seem to indicate that the former system may be depended upon to give the best results.



·DIAGRAM·SHOWING·LOOP·
·SYSTEM·OF·HOT WATER·
·SUPPLIES·

The determination of sizes for hot water circulation pipe is a problem which requires careful consideration. It is difficult to lay down hard and fast rules for sizes of pipes for different installations, but in general it might be stated that the return circulation pipe in a loop should not be less than one-half the size of the supply line. For example, if the supply riser of the loop is one and one-half inches in diameter, the return line should not be less than three-quarters of an inch for installations where many fixtures are to be supplied from both rising and return sides. The sizes can be best determined by practical experience rather than by an arbitrary rule.

The hot water supply system should be installed throughout in brass pipe, preferably iron sized brass, as the expansion and contraction of tubing if used might develop defects not visible under the preliminary pressure tests. Lead lined or tin lined iron pipes are used in some cases for hot water systems, as well as for cold water pipes. Plain iron or galvanized iron pipes should not be used for hot water except in the cheapest installations, as the "rusting" and "scaling" take place even more freely than when the same kind of pipes are used for cold water.

Hot Water Drum. In office buildings or buildings where there is a considerable demand for hot water, and where the various rising lines throughout the building are supplied from one source, a hot water drum, similar to the drum mentioned for the cold water system, is advisable. The different rising lines or circulating lines should be taken off in the same manner as for cold water. Near the drum shut-off valves should be installed and properly tagged, so as to control various parts of the building independently.

In many instances in large buildings the rising lines are so scattered that it would be exceedingly difficult to supply all of them from one drum. In such cases it is advisable to supply separate drums for a group of rising lines in different parts of the basement and connect these drums with a circulation system.

This would give the same results as if all the rising lines were conducted to one central point and connected into a single drum.

There is a variety of devices on the market at the present time for heating hot water for office and commercial buildings as well as for domestic purposes. These vary from the ordinary heating devices used in residences to the instantaneous heaters used in hotels and large buildings. The most common of all the known devices for residence work in the past has been the water back, water front, or circulating coil installed in connection with a wood or coal range or furnace. For residence work, where a coal fire is used in connection with the kitchen range, a cast brass water front or water back is undoubtedly the best, the difference between these being that the heating surface is placed either at the front or at the back of the fire box. The position with reference to the fire makes but little difference so long as a large amount of surface comes in contact with the heated portion of the fire box. In less expensive installations the water chamber is made of cast iron, but this material is not nearly so satisfactory on account of the great corrosive effect of the alkaline waters on the interior of the water chamber producing what is known as "rusty water." With cast brass this objectionable feature is entirely removed.

The advantage of the cast brass chamber over the circulating coil consists in the fact that a larger surface of water comes into immediate contact with the heated portion of the fire. Unless the fire is banked around the

pipe when a coil is used, only a small portion of the water surface is in actual contact with the heated coals.

A more modern device for heating hot water for smaller installations is the small gas heater which is, as a rule, attached in close proximity to the storage boiler. There are on the market many good types of water heaters which are inexpensive to operate, and which do not readily get out of order. In selecting one of these devices the principal considerations should be: first, to see that as large a surface of the water as possible is presented to the direct effect of the heat; second, the possibility of cleaning deposits, which are products of gas combustion and which eventually cover the exposed surface, forming an insulating medium which prevents the most effective action of the heat on the water.

The next step in the nature of refinement in the mechanical appliances for heating water is the automatic, instantaneous heater in which a small pilot light is kept burning at all times. By the motion of water in the pipe, due to an open faucet, the pilot light ignites the larger flame and produces the hot water almost instantly. The instantaneous heaters of this type are frequently equipped with an automatic thermostatic device for maintaining an equal temperature at all times. By this means if the temperature of the water drops below the fixed point, the flame is automatically ignited and the water rises to a fixed temperature, at which point the flame is again automatically extinguished.

The capacities of these heaters vary from a small size of one and one-half to two gallons per minute to larger sizes, which will produce six to eight gallons of hot water per minute. Care should be taken in selecting a heater of this nature to see that the pilot light is so protected that it will not be extinguished accidentally, allowing the gas to escape in the chamber.

Every form of gas heater should have a vent pipe connected directly to a flue of a chimney or to the outer air, so as to carry off the combustion gases and any leakage of fuel gas which might occur in the apparatus.

There are various forms of combination laundry stoves with a hot water jacket which are in common use in some classes of residences and which give very satisfactory results. These are of cast iron throughout or have a brass water jacket in a cast iron frame. In either case a double service is effected, heating water and affording an opportunity for heating irons in connection with the laundry work.

When the demand for hot water is multiplied to the extent in which it is usually found in office or commercial buildings, the simplest and best installation, where steam cannot be used as a heating medium, is a large storage tank with a small, independent coal heater. The water, continually circulating between the storage tank and the heater, maintains the temperature of the water at almost any desired point. These heaters require but little attention and consume so small a quantity of coal that their cost in the average heating plant is negligible.

Where high pressure steam is used in a building, a type of hot water heater which is instantaneous, and in which no storage tank is required, is made by installing in a large wrought iron pipe a section of brass pipe usually not less than two inches in diameter. The live steam is supplied at one end of the iron pipe, completely filling the space around the outside of the brass pipe, and is returned to the steam plant from the opposite end. The water continually flowing through this superheated steam is raised to a high temperature. The amount of water produced in a heater of this type depends entirely on the length of the pipe around which steam is allowed to circulate, and heaters of this variety are installed in many hotels where the demand for hot water is enormous. One of these heaters used in a Boston installation produces over 100 gallons of hot water per minute. The hot water from the heater is maintained at a temperature of approximately 160 degrees, and at the return end of the circulation loop the temperature is seldom lower than 100 to 120 degrees.

The storage tank should be carefully estimated to give the proper volume of water to supply all of the fixtures at hand without a perceptible diminution of supply.

In ordinary work for a small house a 40-gallon boiler should be sufficient where there is but a single bathroom. Where there are two bathrooms, a boiler of not less than 50 gallons should be installed. In many of the better classes of residences storage tanks as large as 100 gallons capacity are frequently used. In office buildings the capacity of the storage tank is usually estimated at about one and one-half gallons per office and should be never less than 200 gallons except where the demand is small.

These storage tanks are constructed of galvanized iron, black iron, or copper. The copper tanks are superior in durability to the galvanized or plain iron, and where high pressures are to be used, the tanks must be well reinforced.

Every storage tank should be tested or guaranteed by the makers to withstand a certain pressure. Small kitchen range boilers are usually tested to 100 to 150 pounds per square inch and guaranteed for a working pressure of 80 to 125 pounds. The larger boilers should be tested to 250 pounds per square inch and guaranteed for working pressure of 200 to 225 pounds.

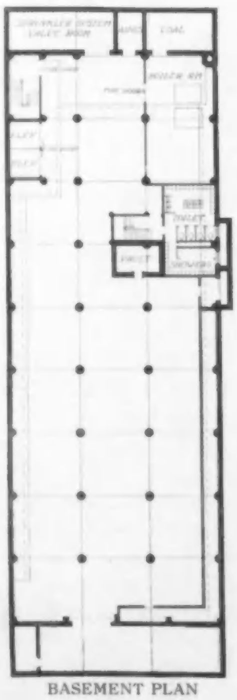
In case a storage tank is used, the water in which is to be heated by steam, a system of coils in the boiler through which the steam is allowed to circulate is usually provided. This is not advisable in the case of a low pressure, steam heating apparatus unless there is a large amount of surplus capacity in the boilers. The rapid condensation of the steam, due to the radiating effect of the piping, is too much of a drain on the boiler and robs the rest of the heating system of its proper supply of steam.

In some residences brass coils are installed around the inside of the fire pot of furnaces, steam boilers, and occasionally in hot water boilers.

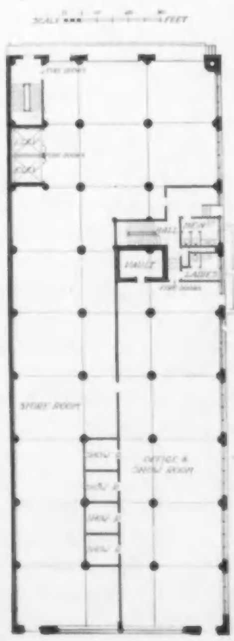
These coils are economical in operation and take but little space around the fire pot. Some other method of heating the water must, of course, be provided where they are used in the summer.

The water from a hot water heating system should never be drawn off for domestic purposes unless it is first filtered, because it is likely to be rusty and also likely to contain more or less grease and oils from the piping itself.

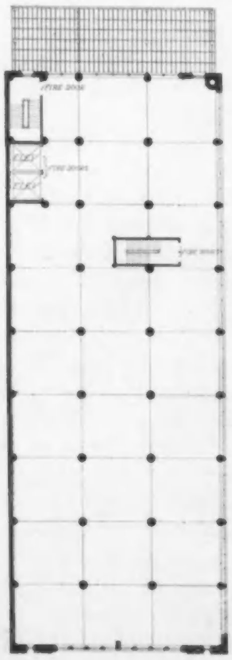
It is advisable in installing a hot water system in a large building to have thermometers placed at the base of the rising lines and also at the base of the return line. In this way a difference in temperature may easily be noticed and by valve adjustment the temperatures throughout the whole system may be readily equalized.



BASEMENT PLAN



FIRST FLOOR PLAN



TYPICAL FLOOR PLAN

THE problem presented in planning this building was that of providing a showroom and offices, together with a large storage space to accommodate the stock of a manufacturer of plumbing supplies. The first floor showroom, together with the sample bathrooms for the display and demonstration of fixtures, are finished in tile, the side walls being blue and the floors buff. The basement showroom is similarly floored with tile, the wall finish, however, being fumed oak. The general offices which adjoin the first floor showroom and have direct access to the storage portion of the building are also finished with fumed oak. There is an additional showroom on the Euclid avenue frontage devoted to the display of rougher materials used in plumbing installation.

The concrete, flat slab type of construction was followed in the erection of the building, the exterior being faced with terra cotta, portions of which are in low toned polychrome to afford ornament. The design is typical of the advancing standards in modern American commercial architecture. The cost complete was slightly under 18 cents per cubic foot.

MERCANTILE BUILDING, EUCLID AVENUE, CLEVELAND, OHIO

J. MILTON DYER, ARCHITECT

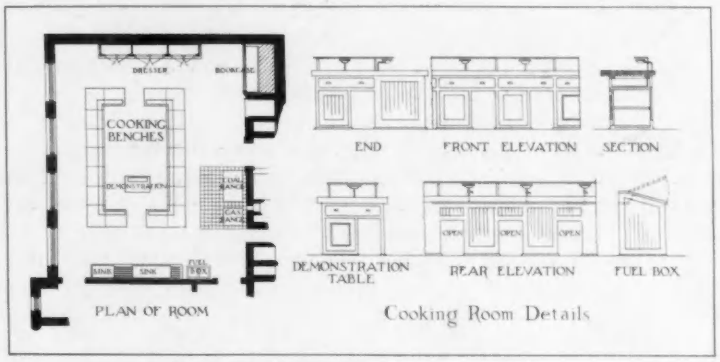
The Modern Schoolhouse.

VI. SPECIAL FEATURES. (Concluding paper.)

By WALTER H. KILHAM.

UPPER elementary school buildings are generally provided with a cooking room, manual training room, and assembly hall, and frequently with a gymnasium and sewing room. In many cities provision is also made for one or more "fresh air" rooms, sometimes to accommodate regular classes and sometimes only for a special class of defective or anæmic children.

The Cooking Room. This may be located in the basement if necessary for reasons of economy, but should be at least half above outside grade. A room of 900 to 1,000 square feet is desirable, preferably located at a corner of the building so as to obtain light on two sides. The walls are treated as in class rooms, but less blackboard space is required — about 10 running feet is sufficient. The floor should be of wood or linoleum, with an ample tiled hearth in front of the ranges. The ventilation should be the same as for a class room, but less heat is required. An additional vent should be provided for the hood over the ranges and a smoke flue for the coal range. A separate wardrobe is not obligatory, but accommodation should be provided for the teacher's street clothing.



Plan and Details of a Typical Cooking Room

The work benches are generally arranged in the form of an oblong or ellipse for a class of about 24 pupils. Each section contains two drawers for utensils, a bread-board arranged to pull out, and a Bunsen burner with a hinged iron grill over it, set on an aluminum plate at each station. Access should be provided to the center from one or two sides. The tops are 24 inches wide, made of pine, and with the bread-boards should not have painter's finish. The benches are open underneath and may be supported on pipe standards. A demonstration bench similar to one section is located in the center.

A dresser for dishes, etc., should be included in the room, to be about 10 feet long in three sections; the upper portion should have four adjustable shelves and glazed sliding or hinged doors. The lower portion contains a set of three drawers and two cupboards with shelves. A fuel box is needed for the coal range; this should have two compartments each, about 24 inches square and 30 inches deep, with hinged lids and with a small shelf in one section. Accommodations should also be provided in the main coal room for a supply of range coal and kindling wood. A bookcase similar to those in other class rooms should be provided.

Near the ranges should be installed a soapstone sink 4 feet long, with two cold and two hot water cocks and soapstone drip shelves 24 inches long at each end, and provided with a grease trap. The coal and gas ranges should have six holes each and be provided with tile hearths and hoods. Space should be allowed for a refrigerator with drain. In connection with the cooking room a pantry is useful but is not always included, and similarly a space large enough for a dining table for use in demonstrations. This is sometimes located in the space enclosed by the work benches. The above represents what might be considered as minimum requirements for a cooking class. Some prefer modifications or improvements on this arrangement, such as finishing the work benches in white tile and rather elaborate cupboards and dressers, and others recommend placing a white porcelain sink between every two sections; but it would seem as if the most appropriate equipment would be that which would most closely approximate the ordinary kitchen of the pupils' homes.

The Manual Training Room. The size, location, and general description of this room are similar to those of the cooking room. A small demonstration stand may be built in one corner, if desired, with two or three raised steps, but this is sometimes omitted. About 15 feet of blackboard is included, with a bookcase and teacher's closet. The small stock room adjoining may be of about 80 square feet in area, with 18-inch shelving running around it, 5 feet 6 inches and 6 feet 6 inches from the floor. There should also be a storeroom with all the shelving possible for finished work and hardware; an area of 40 square feet is adequate. The work rack in Boston schools is made about 28 feet long, in sections 6 feet 6 inches high and 2 feet deep. The length is made to take twenty-four compartments, or as many compartments as there are benches in the room, and the height equal to the number of divisions that use the room (two each day, five days, outside limit). These compartments have numbers and letters painted. A soapstone sink 3 feet long, with hot and cold water and drinking fountain, is installed; also electric or gas connection for the glue pot. Four display frames of burlap over a soft wood, with a 2-inch moulding around, are included in the equipment.

The Assembly Hall. Upper elementary schools are usually provided with an assembly hall large enough to accommodate 400 to 800 pupils. If the school is a large one, of 20 to 40 rooms, it is rarely considered necessary

to build a hall capable of containing the entire enrolment of the school at one time, although the teaching staff frequently asks for it. In New York City the seating capacity of high school assembly halls is generally about 50 per cent, and in elementary schools 33 per cent of the entire enrolment. While a great deal is claimed for the inspiriting effect of a convocation of the entire school at one sitting, the investment of capital for a great auditorium which in the nature of things can be utilized for only a small portion of the time is so heavy as to generally preclude its being undertaken except under the pretext of providing a gathering place for the outside public of the neighborhood. A hall which will seat 800 or 1,000 people, moreover, presents acoustic problems which unless very carefully treated, in a way frequently hard to obtain in a school building, make it very difficult for addresses by any but experienced speakers. Moreover, in so large a hall it is necessary to build an inclined floor and curved galleries to provide anything like proper sight lines, all of which add to the complication and consequent expense of the building. These difficulties disappear in the halls of 400 to 600 seats, which only require the treatment of any ordinary lecture room.

Assembly halls are to-day rarely constructed anywhere but on the first or ground floor, and a marked demand has arisen for special entrances direct from the outside to facilitate use of the hall by the public without disturbing or interfering with the school. These are generally easily provided and supply the additional exits required by modern ideas of safety. In some quarters an idea seems to prevail that the hall should be a sort of detached building, connected with the main school only by a cloister or corridor, but it is difficult to see how such an arrangement bears on schoolhouse planning. The school has the first claim to the hall and use by the public would seem to be a secondary matter.

Differences of opinion will arise as to arrangement of the stage with reference to the main corridor. If the stage backs against the corridor wall, it is more easily accessible from the main building, but the audience faces those entering; if the stage is at the far end, it will be necessary to provide some secondary means of reaching it, but the general appearance is perhaps better. A hall entered from the side is less desirable from the point of view of seating, but the lighting is better, because of the daylight coming from the side, with neither the stage nor the auditorium facing windows. In some halls where the stage adjoins the corridor the back of the stage is made to be removable, so that when an especially large amount of stage area is desired, a portion of the corridor may be thrown in.

In Boston, assembly halls for elementary schools accommodate from 400 to 800 as the school board may direct. It is not considered necessary to seat the full number of pupils in schools of greater capacity. Floors are level and of wood or linoleum, like the class rooms. Windows are fitted with rebated mouldings to take black shades and are so designed as to make the operation of shades practical and simple. The platform is of a size to accommodate one or, in the larger schools, two classes, and has removable stepped platforms of wood to take the seats. Galleries may be used where the hall is two stories in height. Anterooms near the platform are desirable as well as a connection from adjoining class rooms to the anterooms or directly to the platform. A dignified architectural treatment of the walls and a studied color scheme for walls and ceiling is expected. The lighting, acoustics, and exits are such as belong to a small lecture hall. Artificial lighting must be under control from at least two points, one of which must be near an exit. An electric outlet for a 30-ampere projection lantern is installed 25 feet from the curtain. In the ceiling over the platform a recess is provided for a spring rolled curtain 13 feet long. Moving-picture booths are now being provided for the larger halls.

The state of Massachusetts imposes certain further provisions in the line of safety on school halls whose operation and construction is not controlled by the Boston city ordinances. These are in general as follows:

"When not above the second story of the building these assembly halls may have a stage or recessed platform, on which such fireproofed scenery and other stage appliances as the inspector shall approve may be used, and with such proscenium protection as the inspector shall, in each case, direct. If the assembly hall is above the second story of the building, it may be used for such entertainments not requiring the use of scenery and other stage appliances as the inspector may approve, and for public gatherings: *provided, however*, that an assembly hall in the third story of a building of exceptional construction and egresses, having a stage with approved fire-resisting proscenium wall of partition and an asbestos proscenium curtain operated by approved mechanism, with an approved automatic ventilator over the stage equal in area to one-tenth that of the stage floor, and with such permanent fireproof scenery and other stage appliances as the inspector shall approve and set forth in detail on the certificate issued for such hall, may be used."

Seats must not be less than 2 feet 6 inches from back to back, measured horizontally, and no seat shall have more than seven seats between it and the aisle. The inspector may prescribe the width of the aisles. For an assembly hall having portable seats, floor cleats or other approved devices for securing the seats in place must be used. For estimating the seating capacity of an assembly hall, 6 square feet of floor space shall be taken as equaling one seat. Each egress from the hall and galleries shall be provided with a sign carrying the word "EXIT" in letters at least 5 inches high. Emergency lights must also be provided, to be controlled near the main entrance and supplied from a separate circuit. Footlights are generally supplied for the stage in a trough, with sections to raise when the sections of the floor forming the covers are turned back.

The assembly hall is usually by far the most important room in the building, and the architectural treatment ought to be such as will impress upon the pupils the effect of good proportions, simplicity, and dignity. All trivial or inappropriate ornament ought to be eliminated. It is difficult to understand the appropriateness of the practice in vogue in many American cities of interpreting the expression "Collegiate Gothic" to mean encumbering the ceilings of the auditoriums with imitations of English hammer beam trusses laboriously carried out in white plaster, and even the up-to-date method of lining off the plaster walls with white "joints" to imitate a Caen stone interior

is somewhat open to question from the architectonic point of view.

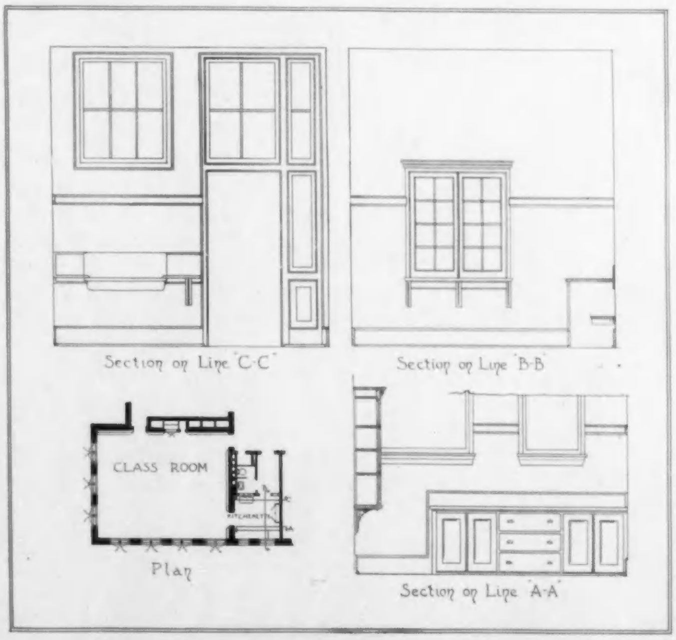
In very large schools, where the auditorium is surrounded by corridors at the gallery level, it may be well to provide windows which can be opened to enlarge the possible gallery space for an unusually large gathering.

The Gymnasium. The subject of the school gymnasium is treated here only in relation to elementary schools. For this type of school a medium sized gymnasium of approximately 35 by 50 to 60 feet will be found sufficient, with a clear height of 16 to 18 feet. The walls may be of brick and the floor of maple, laid diagonally. An observation gallery, preferably on the long side, is desirable, and an outfit of showers and lockers. Running tracks are rarely included. There is a growing demand to combine the gymnasium and assembly hall in one for reasons of economy. When this is done, provision has to be made for storage of seats in some manner.

Exterior Appearance of Wing Containing Fresh Air Room on Upper Story

Gymnasiums are too often tucked away in the basement under the assembly hall or wherever there is a large enough space free from supporting walls and flues. To obtain the necessary height, the floor is carried down into the ground. Where the gymnasium adjoins the outside wall on the east or south side of the building, a fairly healthful and cheerful arrangement may sometimes be obtained; but as was remarked in a previous article on the subject of play rooms, the idea of sending children into a cellar for exercise and recreation seems anomalous on its face. A gymnasium should rather be above ground, with windows in four walls admitting air and sunshine from all directions, and perhaps connected with the main building by a corridor. Better results will be obtained in a cheap shed of this description than in the most elaborate cellar exercise hall ever constructed. As a matter of fact, as much of this work as possible should be done in the fresh air and out of doors. In spite of the severe climate, a great deal more could be done out of doors than is now the practice.

Fresh Air Rooms. It is becoming more and more the custom to provide school buildings with rooms made so as to admit as much outside air as possible. When used for defective or anæmic children who are warmly dressed and provided with a hot mid-forenoon lunch, amazing results are obtained. Children who are dull, lifeless, and sickly ordinarily gain weight, and sometimes develop surprising intelligence under fresh air treatment. The fresh air class room may have the same general finish and treatment as an ordinary room, but when possible ought to be located at the corner of the building so as to admit windows on two sides, and provided with a type of window which when open admits fresh air through the entire area of the opening. Casements have been quite generally used but have to be hooked back and are apt to rattle and occasion trouble. Windows of the balanced sash type are suitable for the purpose and have some advantages over casements. To prevent rain beating in, Mr. E. F. Guilbert in his Newark schools introduces a sort of sloping canopy or shield of wired glass just above and outside of the windows which deflects the rain and protects the interior. Some direct heat is generally provided, but there is no need of an interior fresh air supply — except to satisfy the inspector. In Massachusetts fresh air rooms cannot be constructed unless they are equipped with complete interior heating and ventilating the same as other class rooms.



Plan and Details of Fresh Air Room and Adjoining Kitchenette

In connection with the fresh air room a small kitchenette is provided for the preparation and serving of the morning lunch of hot chocolate, jam sandwiches, milk, etc. A china sink with a cupboard for cups and saucers, plates, etc., a small refrigerator with drain, a gas stove and drawers for towels, utensils, etc., completes the equipment. A special toilet is useful if the room is to be used for defectives, and a good sized closet for sitting-out bags, etc., may be required. The present tendency, which is entirely towards more fresh outside air in all the rooms, is bound to greatly modify the prevailing ideas of heating and ventilation.

Vault. Every large school building should have a fireproof vault in connection with the principal's room for the storage of records, savings accounts, etc. This vault should be approximately 6 feet square to allow the card ledger to be wheeled into it.

Fire Prevention. Prevention of fire in a school building is one of the primary objects to be considered in its construction. Facility of egress and the means to promptly extinguish any fire that might occur are also matters of extreme importance and should be kept constantly in the mind of the architect. Fires in schoolhouses may be prevented first by using a fire-resisting construction, and second, by insisting upon order and cleanliness in all closets, storerooms, boiler rooms, and coal pockets. Absolutely fireproof construction cannot always be accomplished within the appropriation, but a second-class building can be so put together as to be reasonably safe. In such a building the plastering will be done directly on the masonry without furring, a perfectly feasible process if the walls are properly constructed; all interior or division walls will be carried up to the roof; ceilings will be plastered on metal lath. Although joists are used which make hollow floors, the extent of concealed spaces is so much limited by the walls that there is only a rather small area in which fire may run. The basements are cut off absolutely from the other floors, any passages through being guarded by fire doors. Stairways are in brick towers (which may be contained within the building), with good doors at the outlets glazed with wired glass. This provides a type of construction which affords only limited lurking places for fire, and no continuous flues through which fire can pass from story to story or go very far horizontally.

George Frisbie Hoar School, South Boston, Mass.
Herbert L. Wardner, Architect
This building shows the use of two different types of windows in the class rooms on the first and second floors for the admission of fresh air through the full area of the opening

The only point which has not been well covered in such a building is the treatment of the space between the upper story ceiling and the roof. Here a space 4 or 5 feet high is sometimes requested by the heating engineers to give access to the dampers. As ordinarily built, the rough ceiling and roof joists supply a large amount of exposed wooden surface split up into rather narrow pieces of wood which would take fire easily and burn rapidly. Even if the division walls run to the roof, it is necessary to provide openings in them, and if provided with tinned doors there is no guarantee that they will be kept closed. A prominent fire protection engineer advises building the roof of plank in mill construction form and making the upper story ceiling of metal lath on channel irons which would somewhat reduce the fire hazard. If this space is to be used for storage, it ought to be sprinkled; but on account of the danger from freezing sprinklers are not desirable there.

The question of standpipes *versus* extinguishers is still argued with some show of reason for both sides. Fire protection engineers seem to favor standpipes on the theory that extinguishers are portable and may be carried away, or not kept in proper working condition. The underwriters' standard is 1¼-inch linen hose and ¼-inch or ⅜-inch smooth bore nozzles. Each line of hose is supplied by a 1-inch line of pipe and valve, and a riser supplying several lines should be proportionately larger.

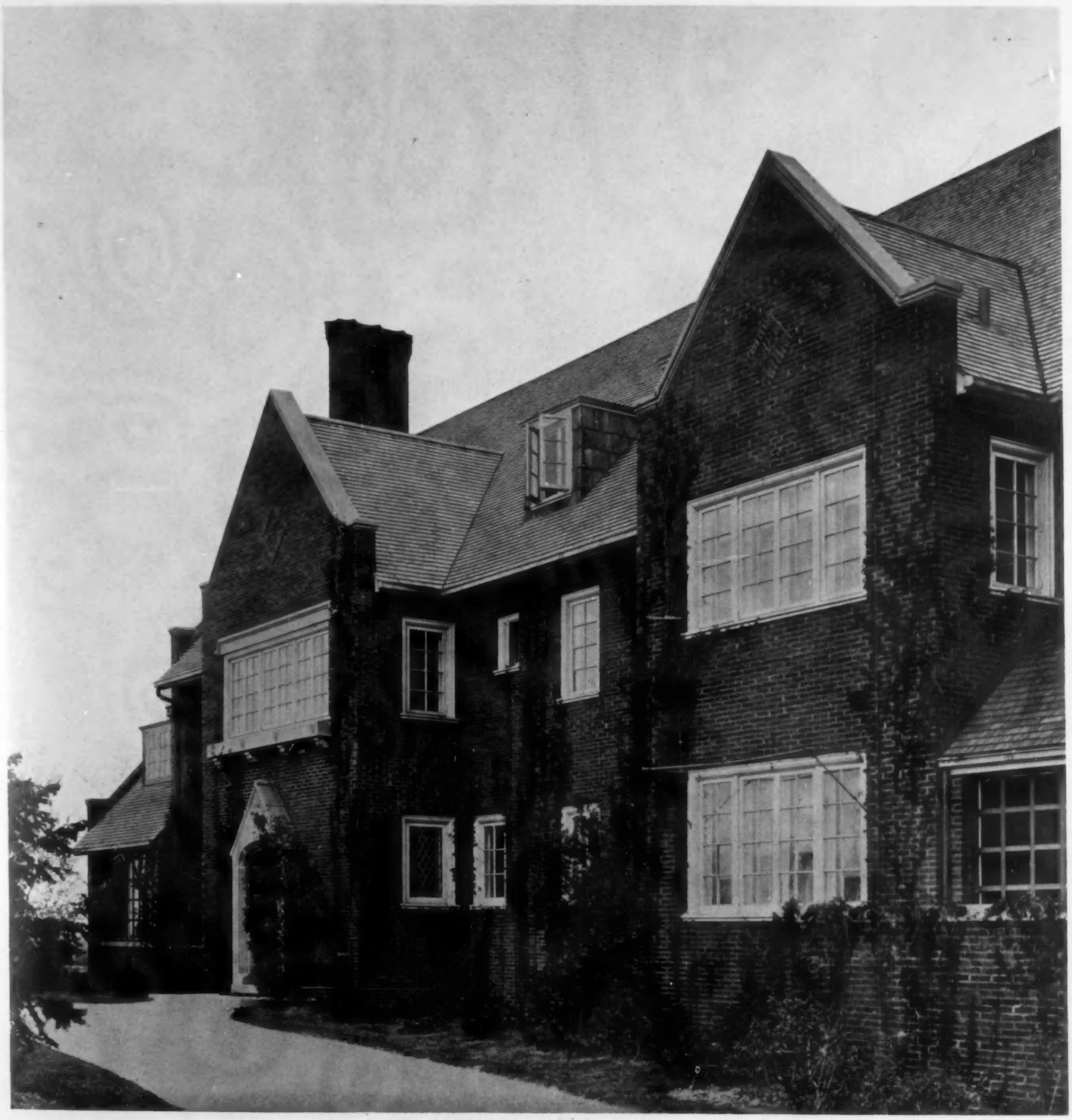
Smaller linen hose is not used on account of kinking, and rubber-lined hose is not advised because the rubber perishes in warm buildings rather rapidly.

Massachusetts requires that the basement and each story of a building shall have some means for extinguishing fire, consisting of standpipe and hose or approved fire extinguishers, or both, as the inspector shall direct and locate, and such appliances shall be kept at all times in good condition and ready for use. Where standpipes and hose are installed, approved hose racks and test cocks are to be provided. Sprinklers for boiler room, coal pockets, etc., are a desirable safeguard.

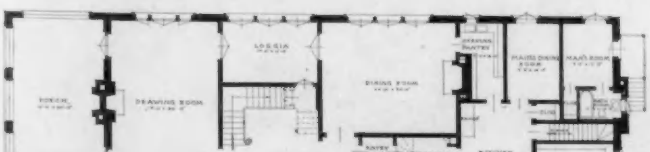
In some buildings a stationary chemical tank and apparatus is located in the basement with pipes leading to hose reels in the different stories. Provision is made for operating the apparatus from any station in the building. Such an apparatus if installed should be placed under the care of the Fire Department, as the janitors usually fail to be impressed with the necessity of keeping it in condition.

Probably the greatest safeguard is that of so cutting off drafts as to divide the building into numerous fire-tight compartments. This naturally involves cutting off corridors by various wired glass partitions, so that each section would have its own properly protected stairway. Such an arrangement is objected to on account of cutting off the view of the monitors appointed to watch the corridors, and as a matter of fact, considering the small number of fires in really properly constructed buildings, they hardly seem necessary. Fire engineers recommend their being held open by a fusible link and chain, which is also attached to an electric catch which is released by the same current that sounds the fire gongs and allows the doors to close.

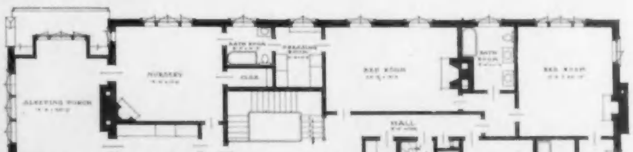
HOUSE OF CHARLES PAXTON, ESQ., LAKE FOREST, ILL.
RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS



DETAIL OF ENTRANCE FRONT



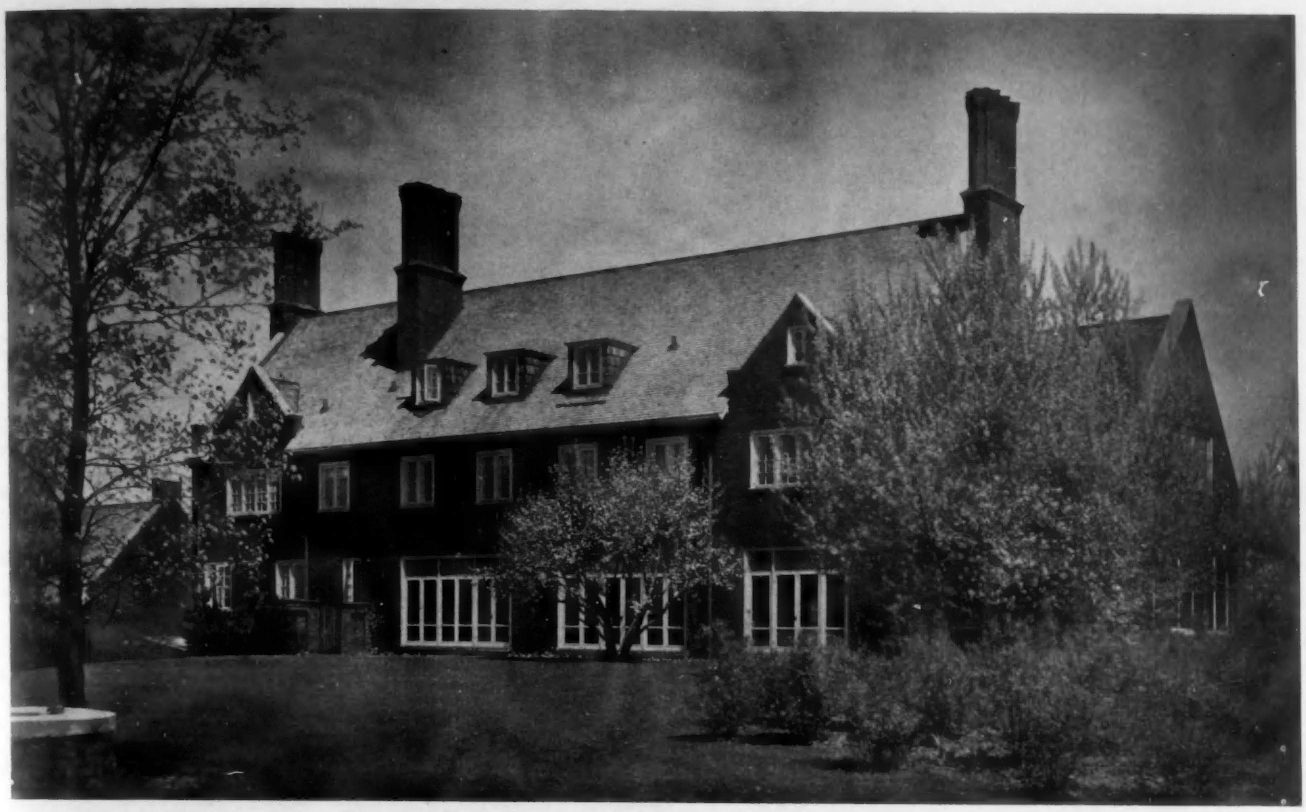
FIRST FLOOR PLAN



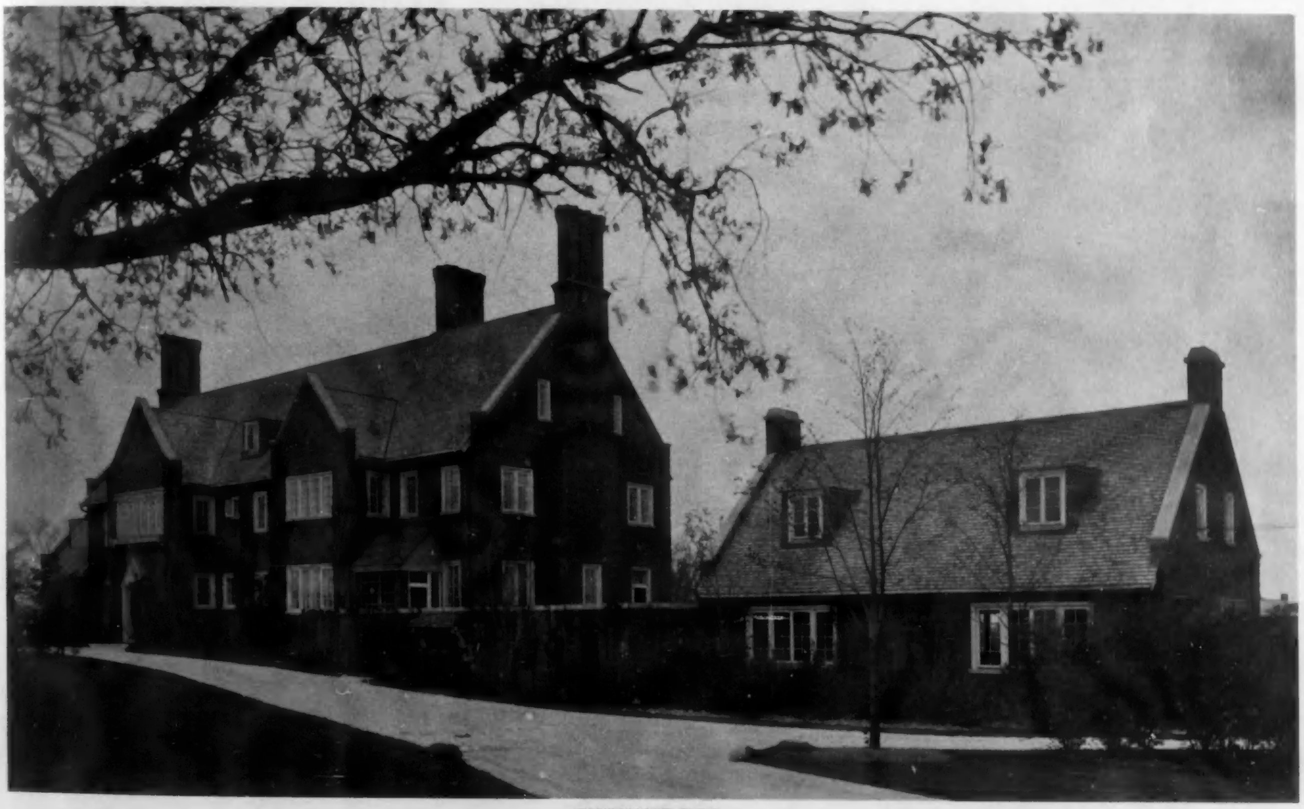
SECOND FLOOR PLAN

HOUSE OF CHARLES PAXTON, ESQ., LAKE FOREST, ILL

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS



GARDEN SIDE



ENTRANCE SIDE

HOUSE OF CHARLES PAXTON, ESQ., LAKE FOREST, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

VIEW ALONG TERRACE

HOUSE OF E. D. SPECK, ESQ., GROSSE POINT, MICH.

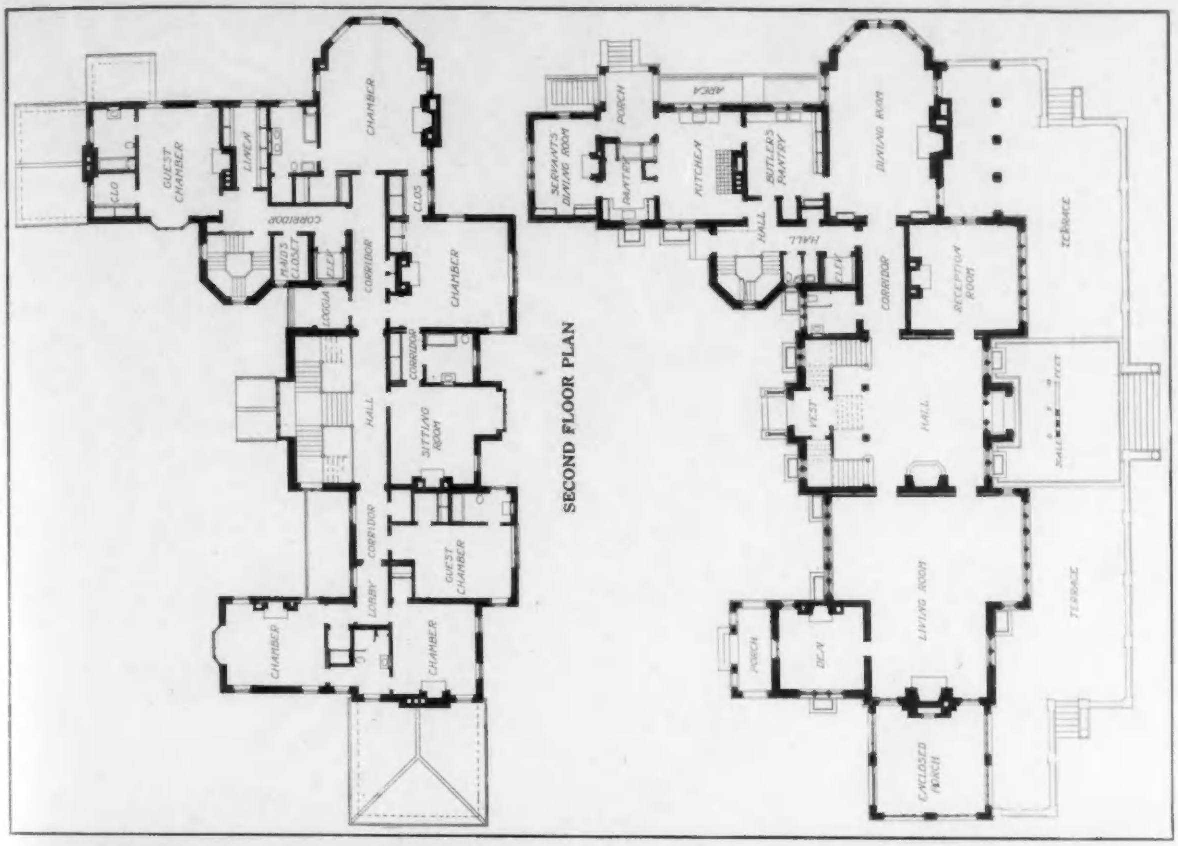
ALBERT H. SPAHR, ARCHITECT

VIEW OF TERRACE FRONT

VIEW FROM ENTRANCE DRIVE

HOUSE OF E. D. SPECK, ESQ., GROSSE POINT, MICH.

ALBERT H. SPAHR, ARCHITECT



SECOND FLOOR PLAN

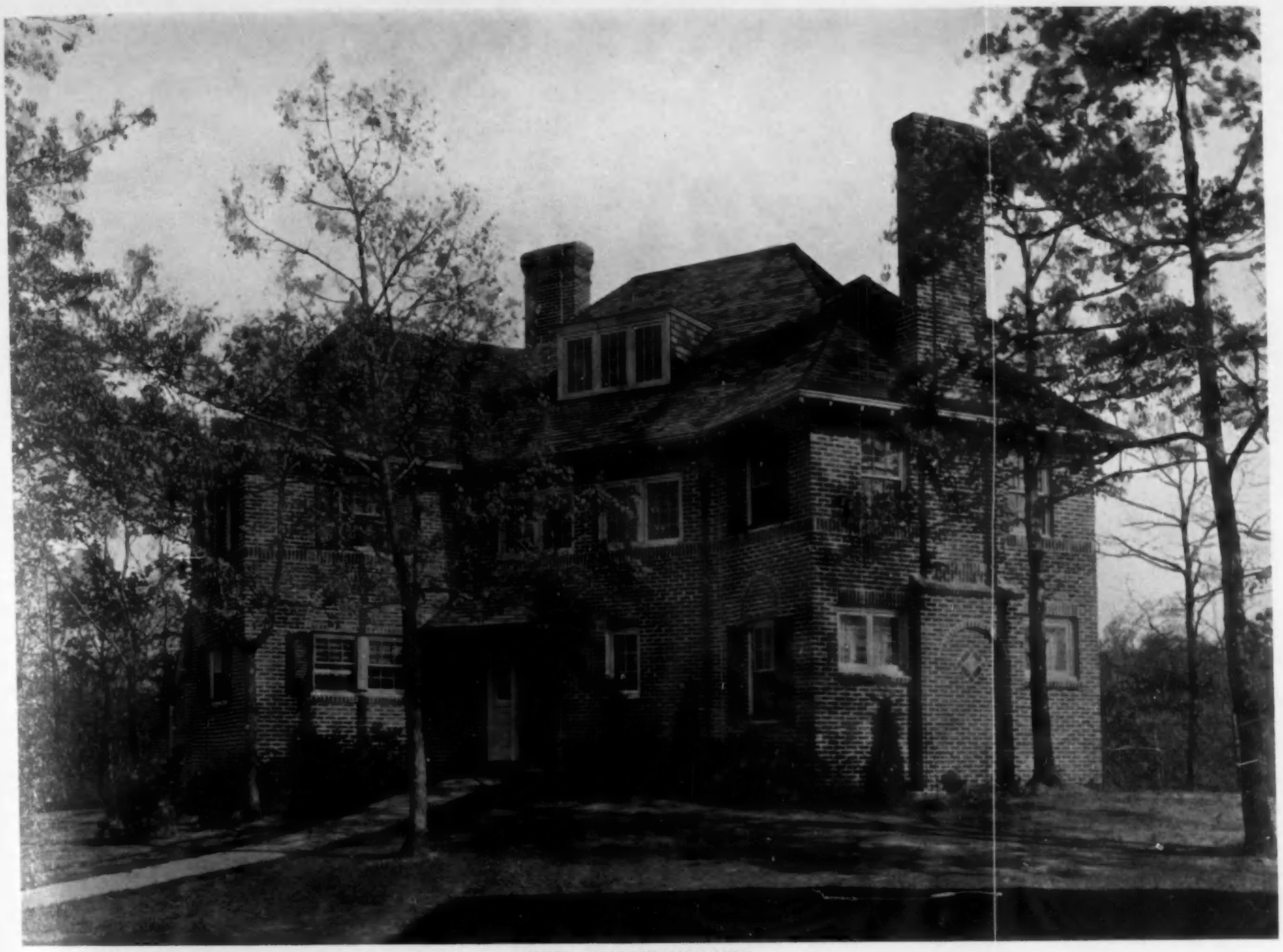
FIRST FLOOR PLAN

DINING ROOM

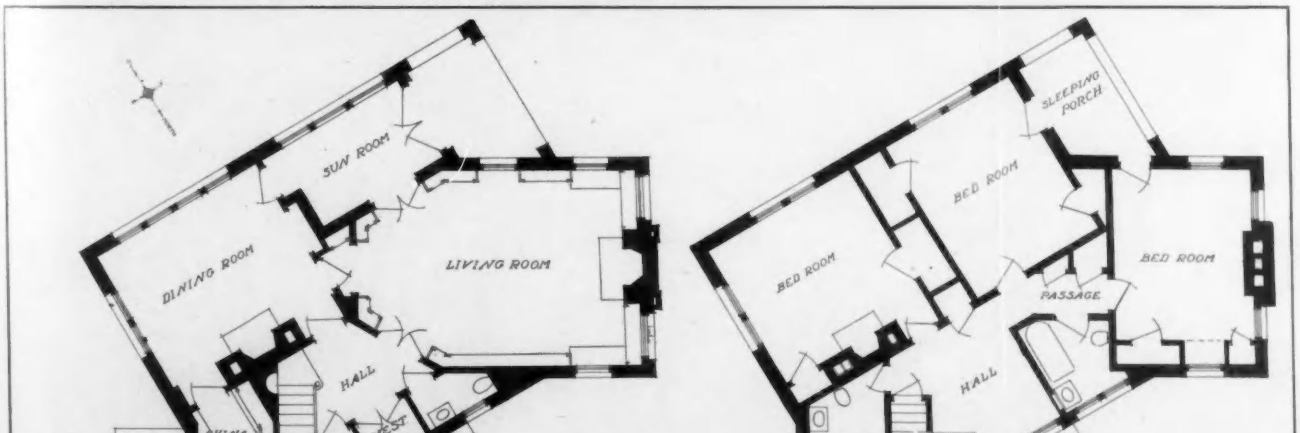
MAIN HALL

HOUSE OF E. D. SPECK, ESQ., GROSSE POINT, MICH.

ALBERT H. SPAHR, ARCHITECT



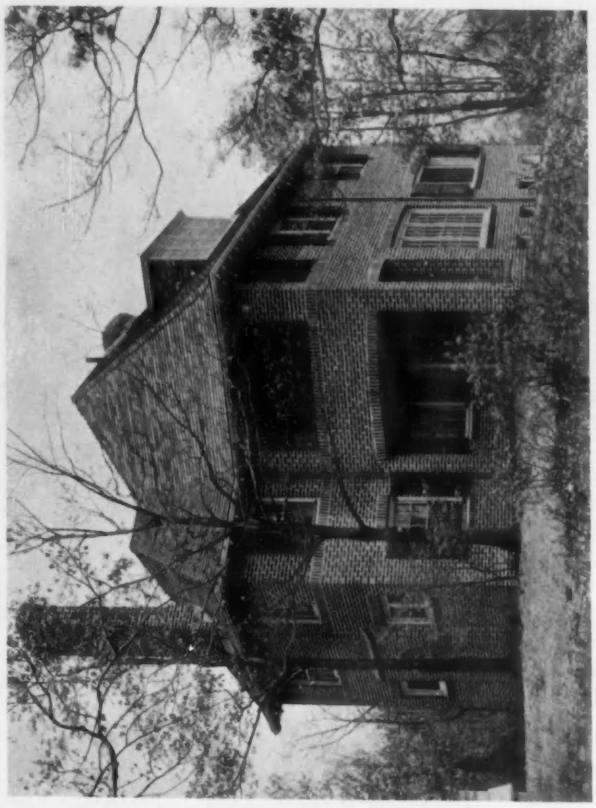
VIEW OF ENTRANCE SIDE



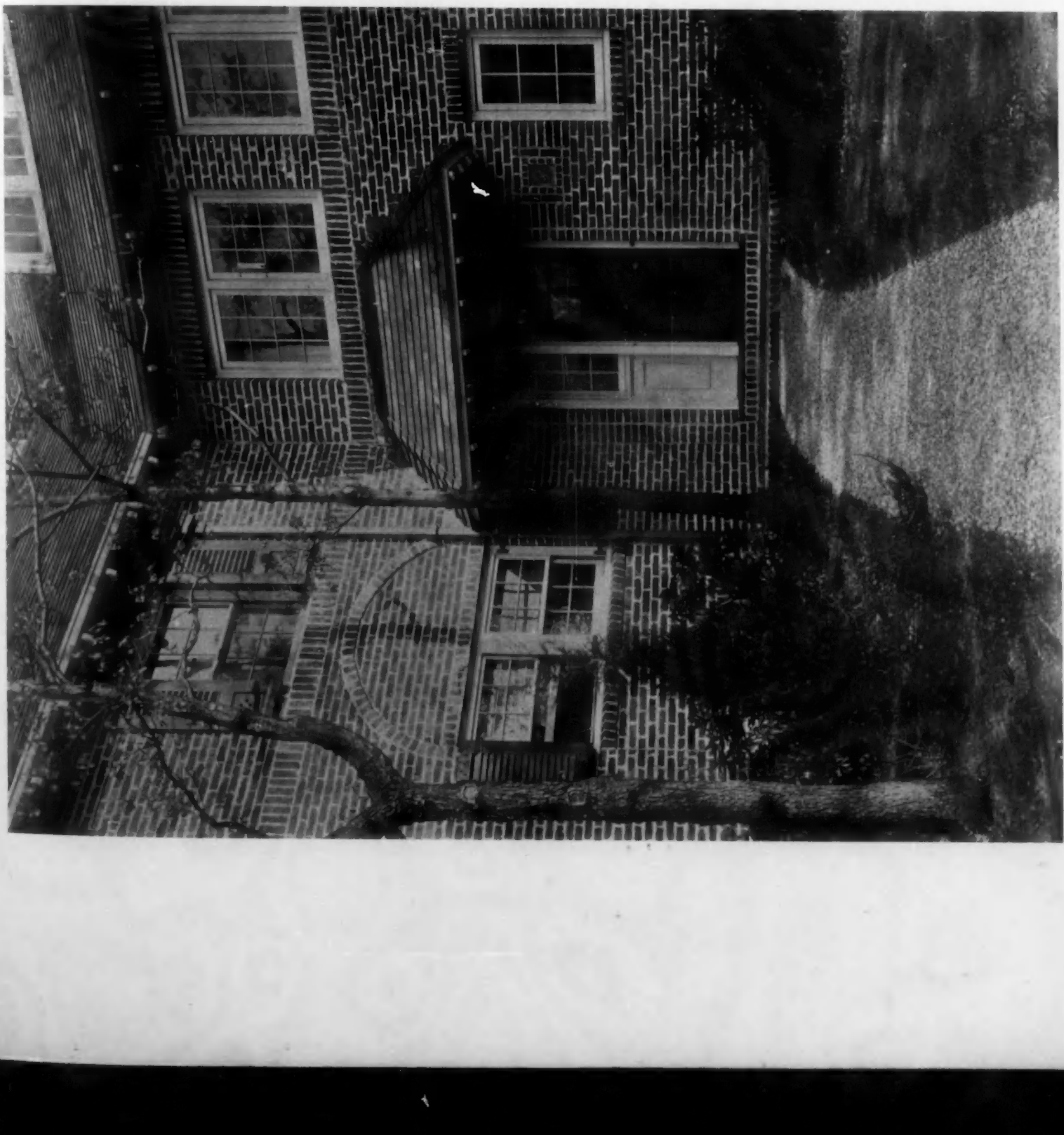
HOUSE AT NEWTONVILLE, MASS.

FRANK CHOUTEAU BROWN, ARCHITECT

VIEW FROM SOUTHEAST



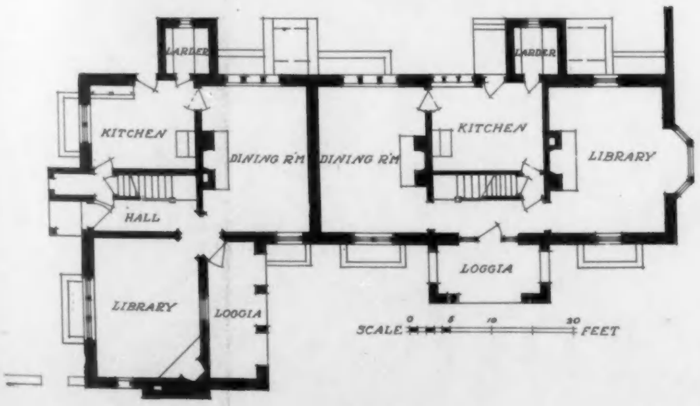
VIEW FROM SOUTHWEST



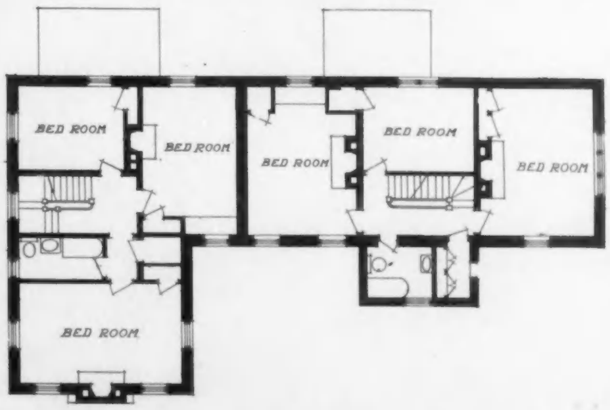
DETAIL OF ENTRANCE

HOUSE AT NEWTONVILLE, MASS.
FRANK CHOUTEAU BROWN, ARCHITECT

DOUBLE HOUSE AT ST. MARTINS, PA.
EDMUND B. GILCHRIST, ARCHITECT



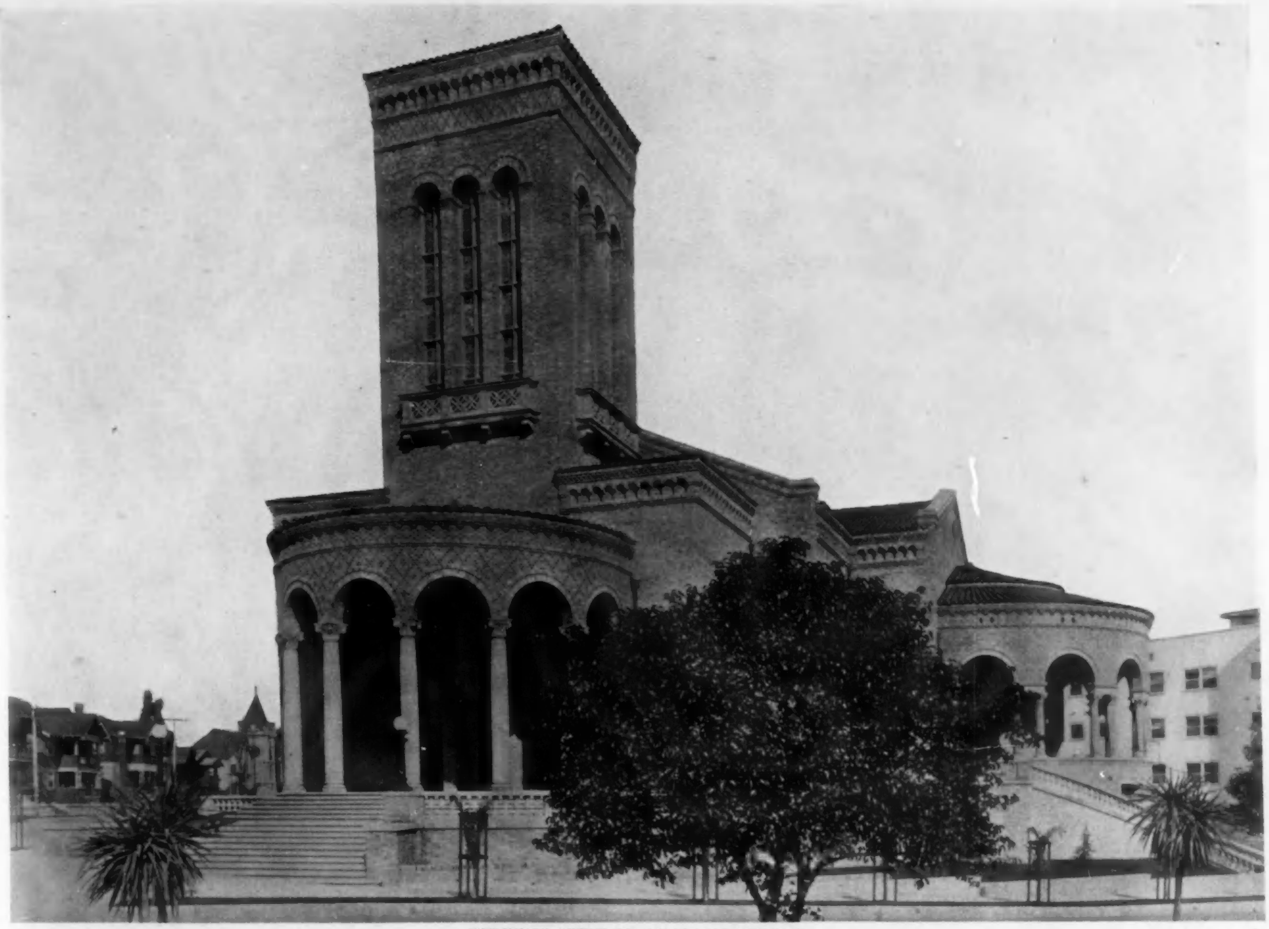
FIRST FLOOR PLAN



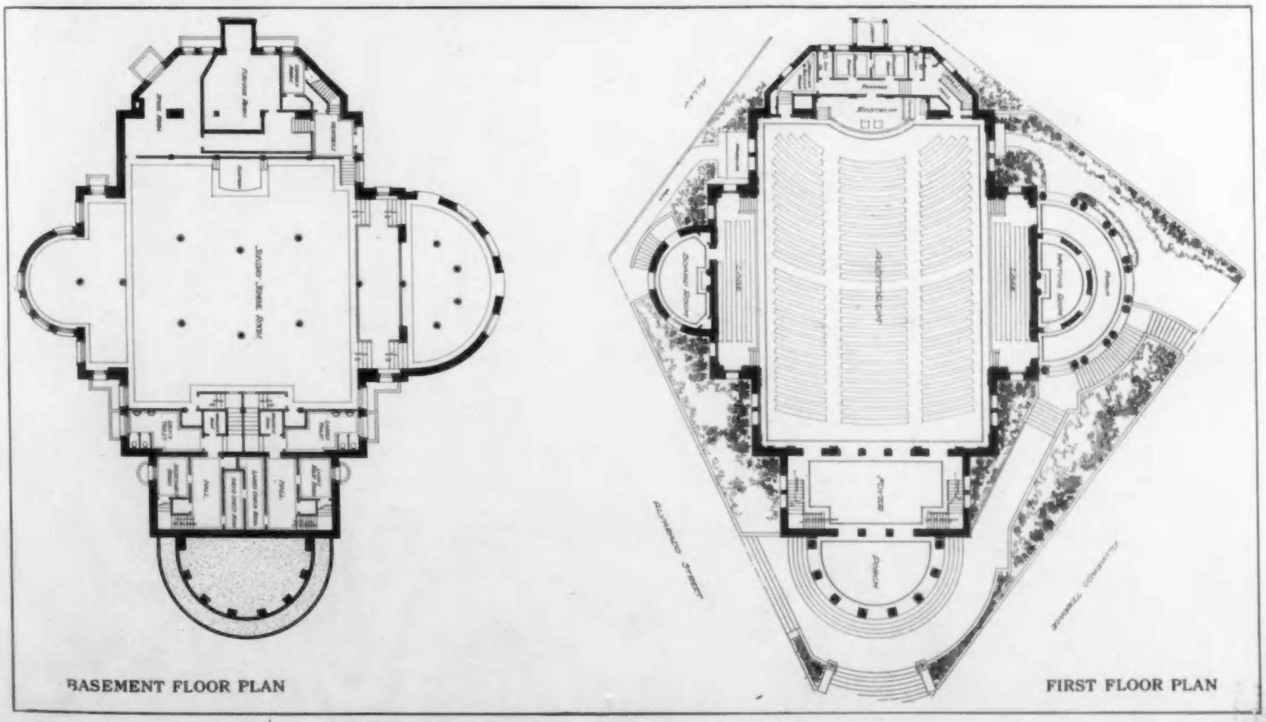
SECOND FLOOR PLAN

DOUBLE HOUSE AT ST. MARTINS, PA.

EDMUND B. GILCHRIST, ARCHITECT



GENERAL VIEW OF ENTRANCE FRONT

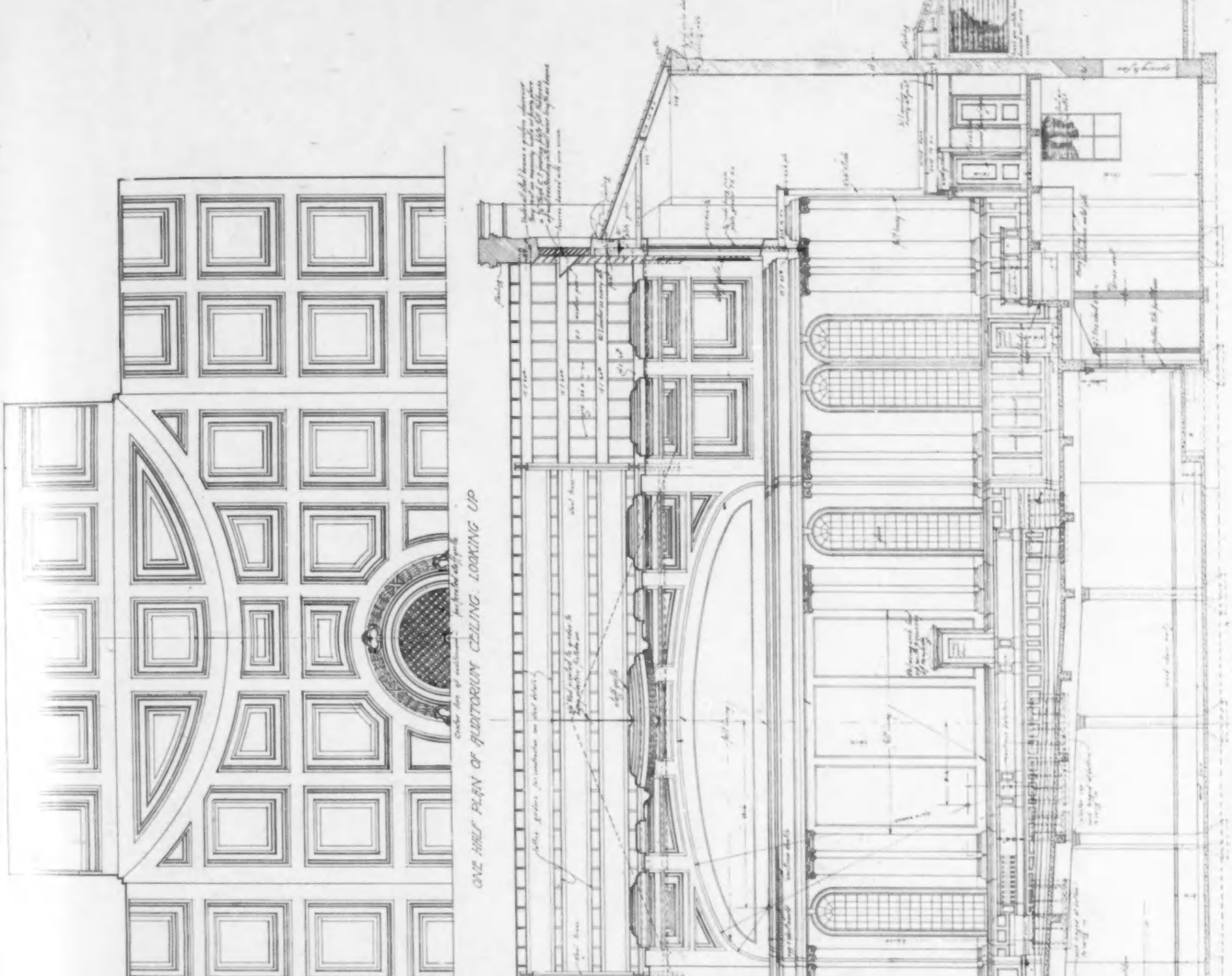


BASEMENT FLOOR PLAN

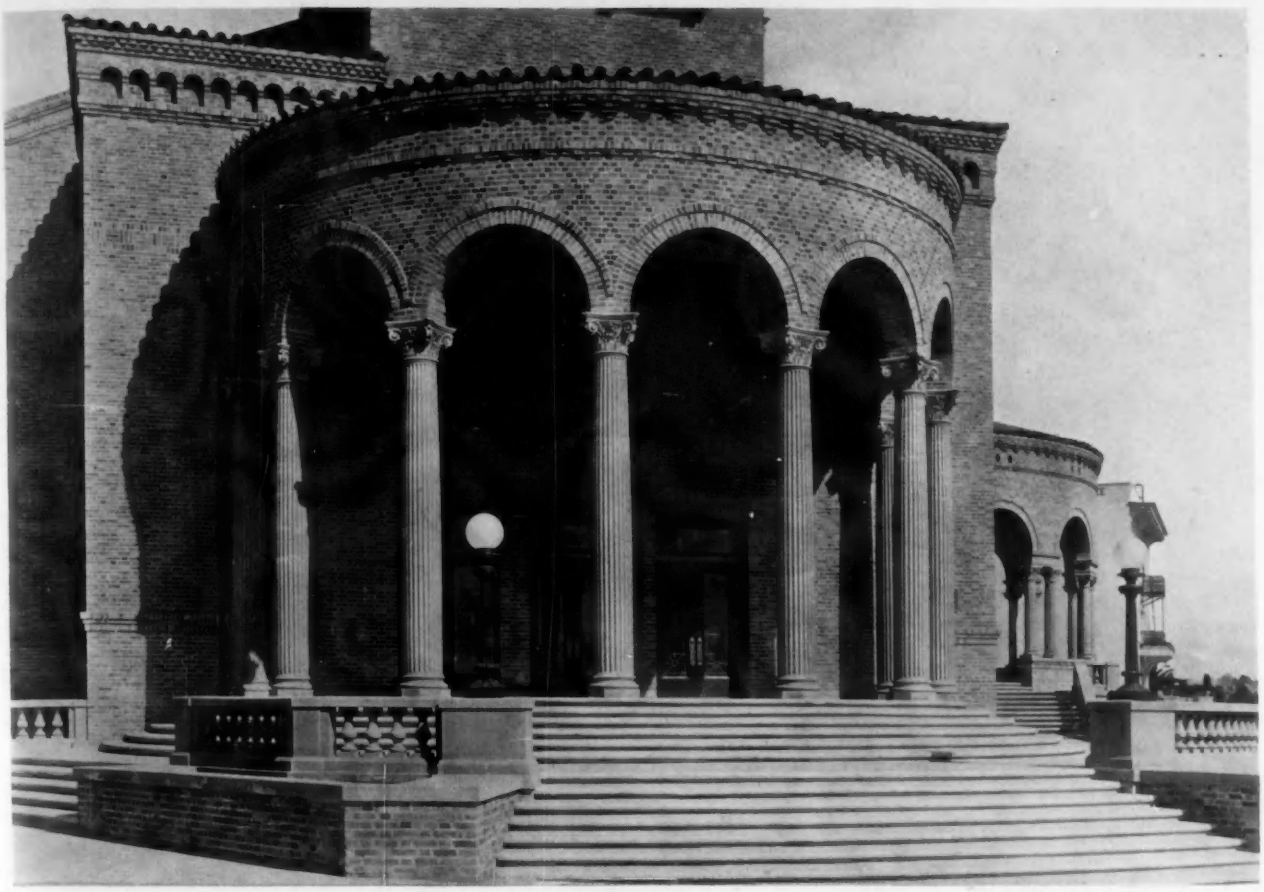
FIRST FLOOR PLAN

FIRST CHURCH OF CHRIST, SCIENTIST, LOS ANGELES, CAL.

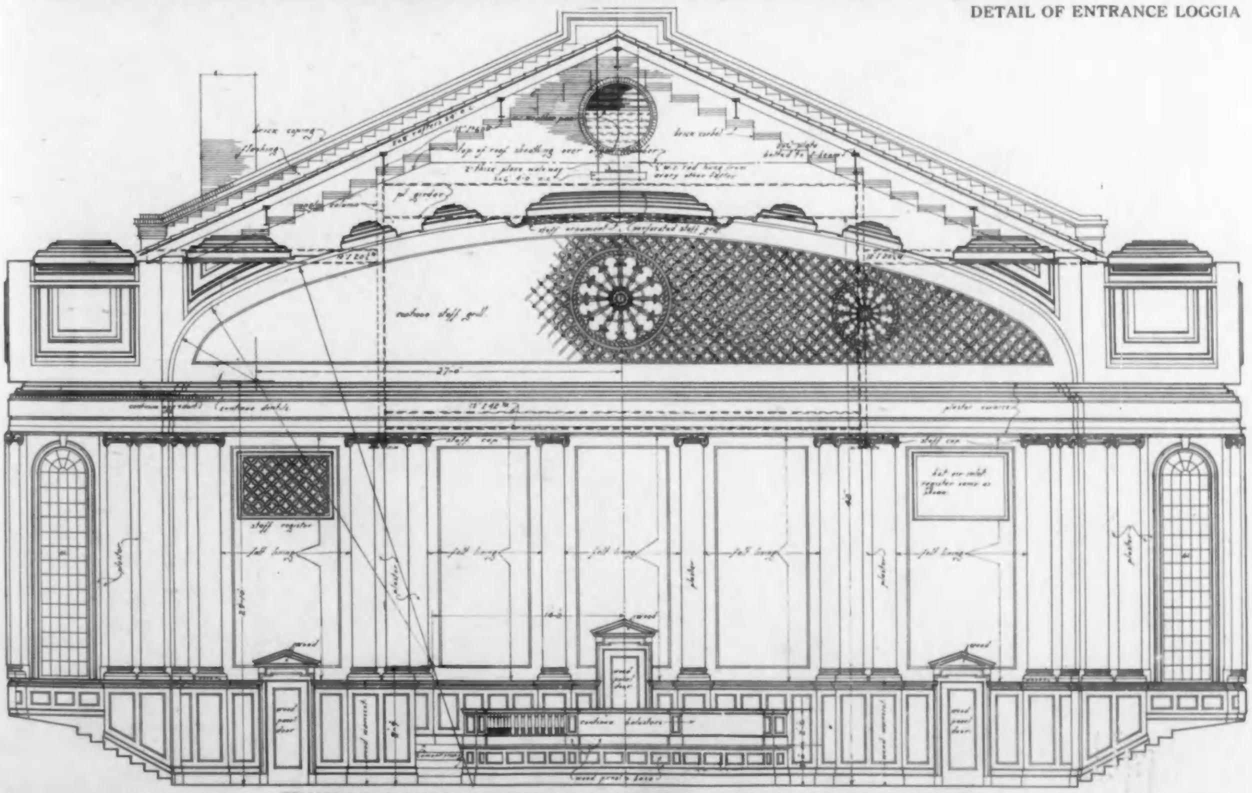
ELMER GREY, ARCHITECT



LONGITUDINAL SECTION THROUGH AUDITORIUM
FIRST CHURCH OF CHRIST, SCIENTIST, LOS ANGELES, CAL.
ELMER GREY, ARCHITECT



DETAIL OF ENTRANCE LOGGIA

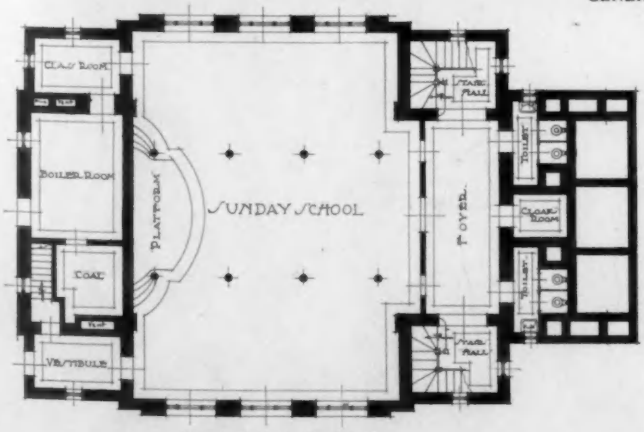


TRANSVERSE SECTION THROUGH AUDITORIUM LOOKING TOWARDS ROSTRUM

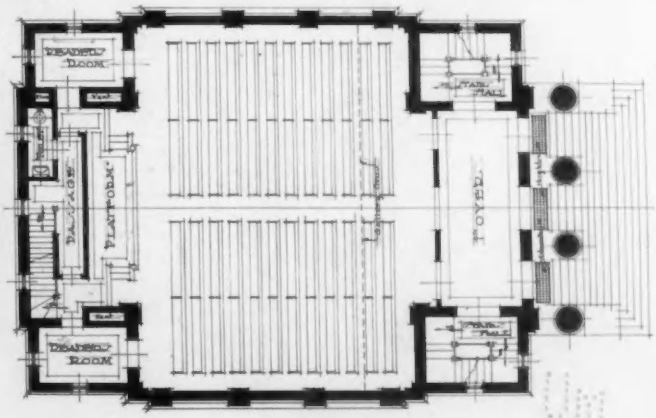
FIRST CHURCH OF CHRIST, SCIENTIST, LOS ANGELES, CAL.

ELMER GREY, ARCHITECT

GENERAL VIEW



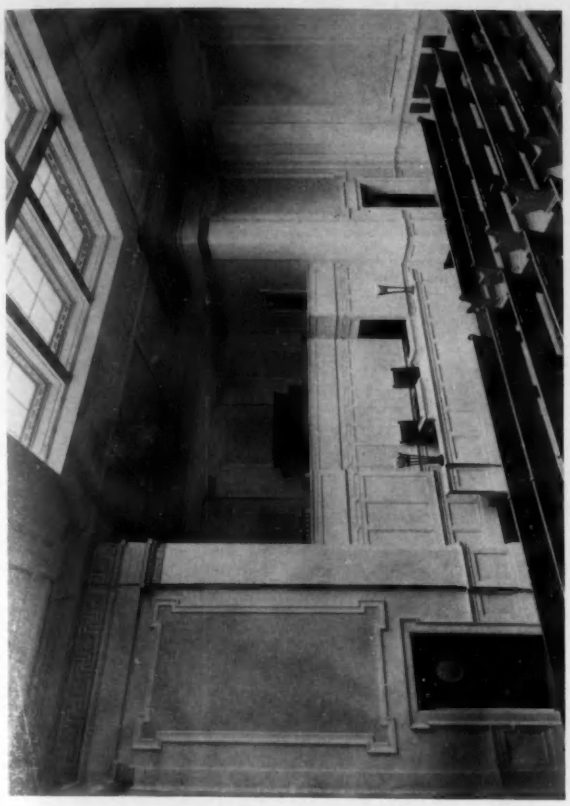
BASEMENT FLOOR PLAN



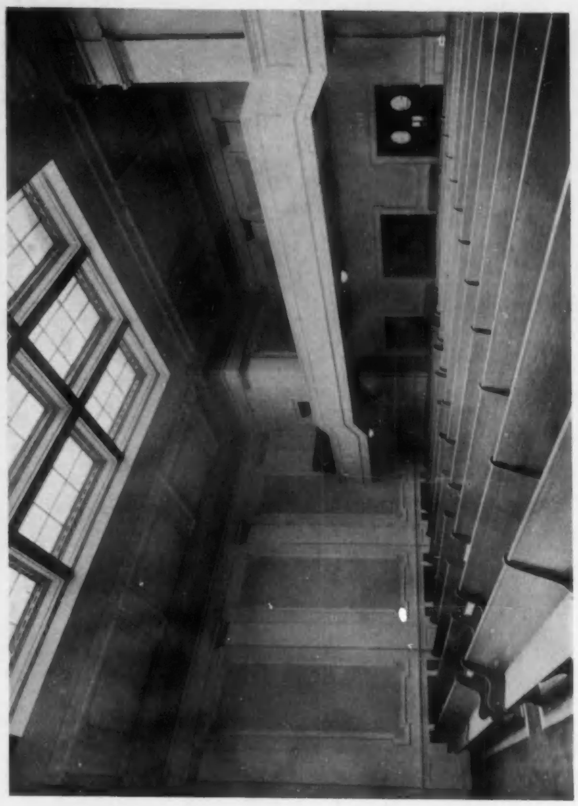
FIRST FLOOR PLAN

FIRST CHURCH OF CHRIST, SCIENTIST, WORCESTER, MASS.

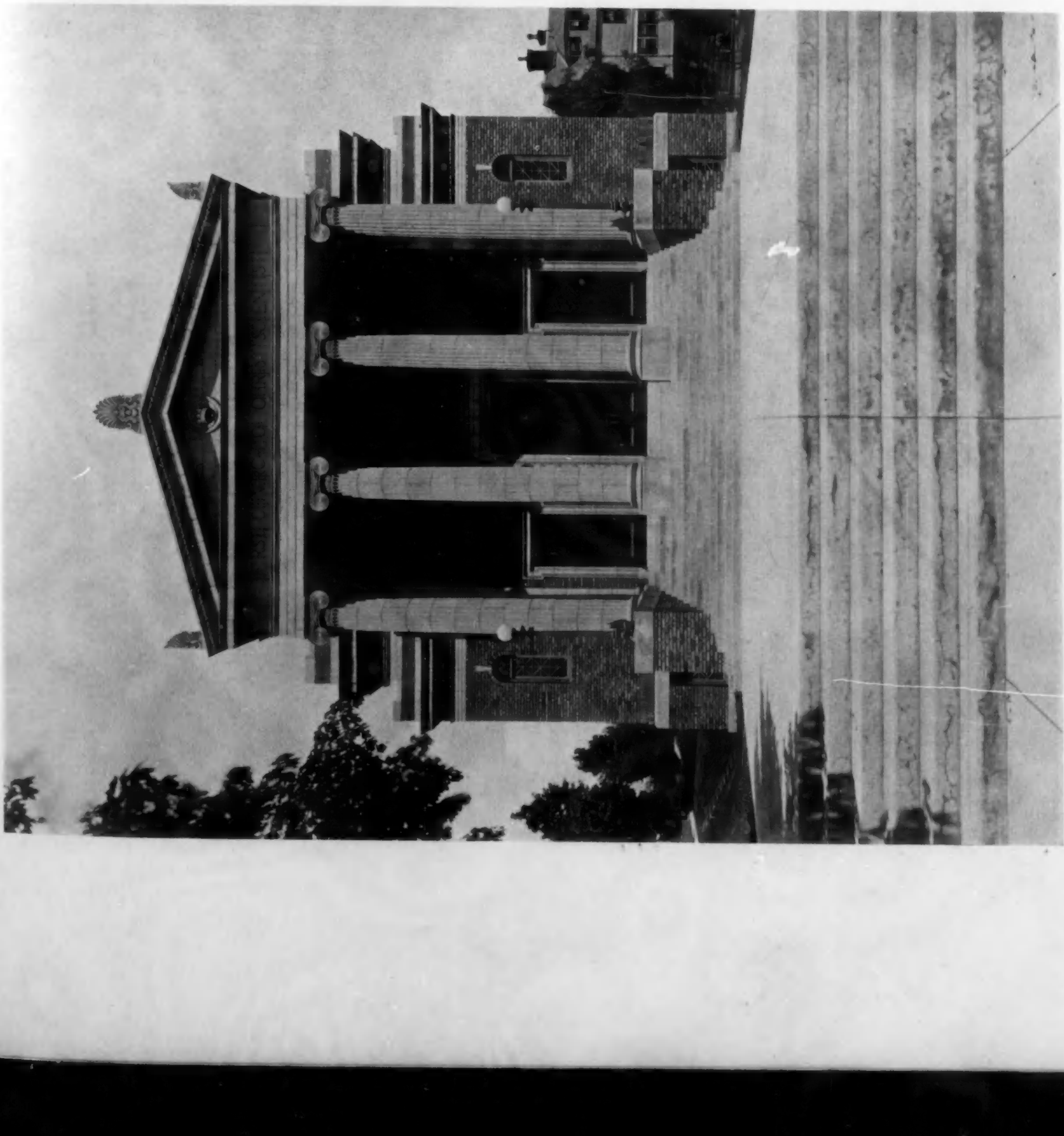
O. C. S. ZIROLI, ARCHITECT



INTERIOR LOOKING TOWARDS ROSTRUM



INTERIOR LOOKING TOWARDS GALLERY



DETAIL OF ENTRANCE PORTICO

FIRST CHURCH OF CHRIST, SCIENTIST, WORCESTER, MASS.

O. C. S. ZIROLI, ARCHITECT

As He Is Known, Being Brief Sketches of Contemporary Members of the Architectural Profession.

GEORGE STRAFFORD MILLS

GEORGE STRAFFORD MILLS was born in London, England, Dec. 5, 1866. However, few if any of his intimates are aware of his English origin, for if there be a quality of alertness and perspicuity typically American, Mr. Mills is an excellent representative of that type. He was but four years of age when, with his parents, he came to this country, and while he is essentially American, he is fortunate in having been endowed by birth and environment with the best qualities of the two great nations. His boyhood was spent in St. Louis, where he received his early education. He was graduated from the Manual Training School of Washington University, following which he entered the office of George I. Barnett, the pioneer architect of the West.

In 1885 he accepted the position of instructor of drawing in the Scott Manual Training School in Toledo, and in less than three years became the superintendent of that institution. The manual training movement was then in its infancy; but the Toledo school under the direction of Mr. Mills soon became one of the foremost institutions of the kind, not only of the country, but of the world.

In 1893 Mr. Mills returned to the practice of architecture, in which he has ever since been an indefatigable worker. In 1900 he was admitted to membership in the American Institute of Architects. In 1912 he formed a partnership with George V. Rhines, Lawrence S. Bellman, and Charles M. Nordhoff, who had been associated with him.

At the beginning of his career Mr. Mills set up for himself a high ideal and throughout his subsequent practice has assiduously striven to achieve it. By so doing he has won for the architectural profession of his community and state a greater respect and has given to the public a clearer conception of the proper practice of architecture.

From his father, who was well known as art critic of the St. Louis Republican, he seems to have inherited the ability of keen, impartial, and well balanced criticism. This balanced judgment, his knowledge of men, and his easy companionship have made his advice sought in many phases of activity outside his own profession. The Great Chemist of the Universe seems in George Strafford Mills to have given us a happy combination of the real and ideal, the business judgment, and the artistic ability, so that he contributes much to his profession, much to the community, and much to the hosts who delight to call him friend. — *G. W. S.*

ALBERT H. SPAHR

ALBERT H. SPAHR was born at Dillsburg, Pa., on June 19, 1873. He entered the office of Harry W. Jones, of Minneapolis, in 1889, and after spending five years in this office went to the Massachusetts Institute of Technology in Boston, taking the two-year special course in architecture. In 1896 he spent the summer in England and France. On returning to this country he entered the office of Peabody & Stearns, of Boston, remaining there until 1901 when he went to Pittsburgh and formed a partnership with C. D. MacClure, under the firm name of MacClure & Spahr. Mr. MacClure died in 1912, since which time Mr. Spahr has carried on the business alone.

It seems to be the aim of many young architects to crowd as much *architecture* as possible in their public or private projects without regard to the feelings of their clients or the public that has to look at their work. They pile orders above each other, and their use of them is so frequent that one often wonders what they would do if Greek frets and Ionic caps were taken from them. We all know the architect that tries to do the Farnese Cornice somewhere up in the clouds, while a column order on the sidewalk darkens the main rooms. Mr. Spahr approaches the subject from a different point of view. Whether in a twenty-story office building or a country house, a set of plans from his office will have every detail studied from the utilitarian as well as the artistic side. Along with a picturesque or monumental treatment of exteriors, the things that count for human comfort and sensible use inside will be carefully thought out. Doors will swing the right way, wall spaces will be left for furniture, light outlets will come where most needed, and radiators slink out of sight. His whole work is marked by a close and particular attention to detail, yet this useful quality does not narrow his conception of architecture as an art, nor does it prevent him giving the full measure of his designing ability to the creation of satisfying architectural compositions as the many large country houses, in which field he has been particularly successful, can testify.

Mr. Spahr is fond of music, as all good architects should be, and when living in Boston often delighted the front rows, from the stage at many of the Cadet performances. In the intervals of absence from smoky Pittsburgh he now leads a nice little family in a dance over his farm in the Berkshire Hills. — *F. H. B.*

ELMER GREY

ELMER GREY received his early architectural training with the firm of Ferry & Clas, of Milwaukee, Wis., during which time he did much of the work in connection with the planning of the Wisconsin State Historical Societies' Library and the Milwaukee Public Library. He was associated with this firm for a period of twelve years, in the meantime crossing to Europe at intervals for the intimate observation and study that go with a bicycle and sketch book. In the early days of his work as a draftsman Mr. Grey came into notice architecturally through his design for a water tower and pumping station which won first prize over mature competitors in a competition inaugurated by the *Engineering News and Building Record* of New York. He practised for three years in Milwaukee and is responsible for the design of the First Church of Christ, Scientist, and many interesting residences in that city. In 1904 he came to California and entered into partnership with Myron Hunt, under the firm name of Myron Hunt and Elmer Grey. For the past four years, since the dissolution of that partnership, Mr. Grey has been practising alone in Los Angeles.

The decade just passed has given California an enviable place in the record of American architecture. The Southland, in particular, has become familiar to all who read for the peculiar charm of its residence work. There is something inspiring in the ample hills, the blue sky, the bigness of the out-of-doors that calls forth latent forces. During this period of development the influence of Mr. Grey's work has been notable, invariably for good, always on the side of sanity and permanence. A man's personality expressed through his handiwork is a very subtle and undefinable thing. It is the intimate quality that remains after all else has been analyzed, classified, and properly accounted for. It may be said with emphasis that all of his works speak of California, they grow out of our soil, they offer just the right mass against the sky, or find position among the eucalyptus and oak in such a way that one has no doubt they have always been there — they have the rare quality of being inevitable. On the other hand, Mr. Grey possesses, in a measure vouchsafed to few in practice, an intuitive feeling for the first great fundamental æsthetic principle which many, alas! stumble over and pass on to prospect in other fields without recognizing an outcropping of gold — that principle which establishes the big proportions of space and mass, solid and void, light and shadow. Even a small cottage may rise to distinction with no other claim. Combining with this perception of good proportions a sense of restrained enrichment, a sympathetic use of materials and choice of colors, we may find a definition of the qualities that attract us most of all in the ensemble of Mr. Grey's work.

— *E. A. B.*

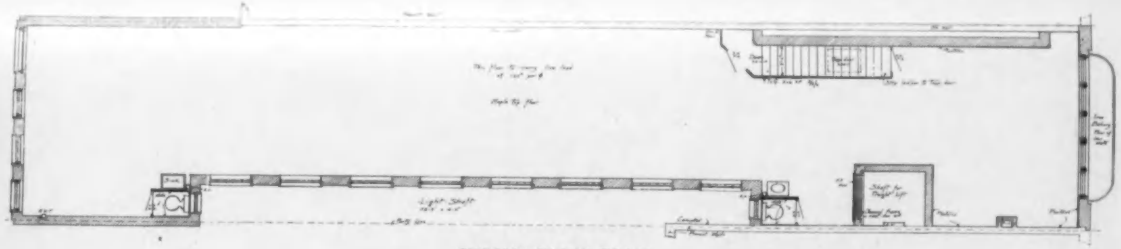
DWIGHT HEALD PERKINS

HERE in Chicago when we think of Dwight Perkins — as we often do — we think of him as a citizen and a patriot almost before we think of him as an architect; and if we wish thoroughly to appreciate his work, we must regard it in the light of his high ideals of the responsibility and opportunities of citizenship. In fact, I am inclined to think that he would unhesitatingly state that the laws and obligations which the commonwealth impose on him are more weighty than those imposed by his profession. This, of course, has resulted in a part of his time and ability always being at the disposal of the community.

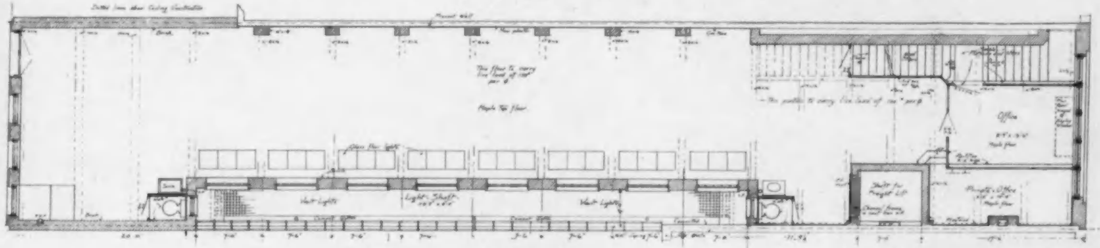
Very naturally Mr. Perkins' altruism has led him into two great fields of service: first, the development of city planning, especially in its relationship to park systems and playgrounds; and, second, the design and building of schools. Chicago owes him a large debt of gratitude for his work through many years as a member of its special Park Commission and as the author of the original Metropolitan Park report recommending the creation of the Forest Reserve district. His work has been equally valuable in initiating and fostering the movement which has resulted in the splendid system of small parks and playgrounds of which Chicago is so proud. His work in connection with school building is readily divided into two phases: first, that done as architect for the Board of Education from 1905 to 1910; and, secondly, the work done by Perkins & Hamilton from 1905 to 1911, and by Perkins, Fellows & Hamilton from that date to the present. As architect for the board he was the author of forty school buildings of all kinds. Mr. Perkins injected into the designing of the schools of Cook County, science of a high order and a certain amount of idealism and originality, a combination be it said in passing which, while highly applauded by his confrères, was not entirely appreciated by the board. Of the work done since 1910, and in which John Hamilton and William K. Fellows share the credit, might be mentioned the new Trier High School, the Lion House in Lincoln Park, the Hamm Building, and many institutional buildings and residences.

Plunging as we did into Mr. Perkins' mature activities we had almost forgotten his beginnings, which are as follows: born in Memphis, Tenn., 1867, student and instructor in the Massachusetts Institute of Technology; draftsman in various offices, culminating in five years with Burnham & Root from 1888 to 1894 (the heroic days of the World's Fair). Since then he has been in independent practice. So much for his deeds, in style — always a delicate subject, I might say he belongs to the party of the Architectural "Young Turks," that he is the sturdy opponent of reactionary design, and that dust has long accumulated on his Vignola and Motifs Historiques.

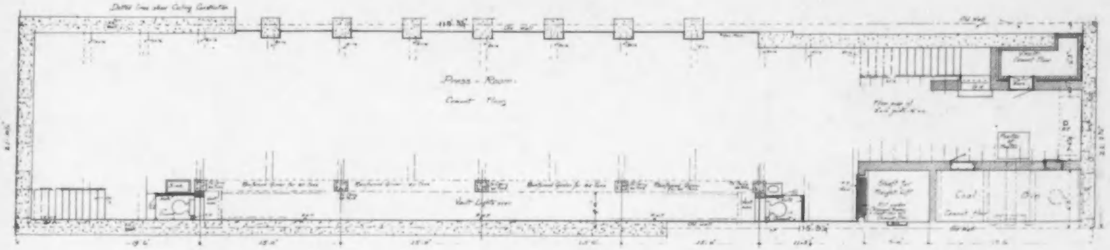
— *T. E. T.*



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

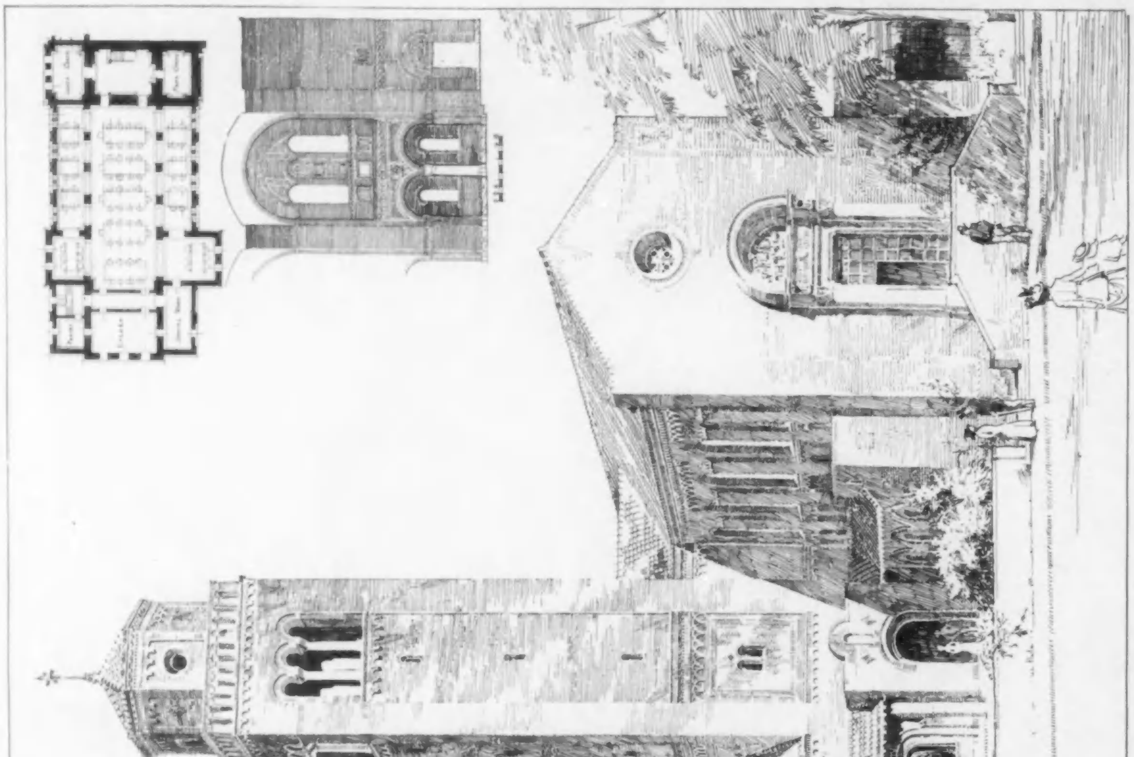
THIS building occupies a lot having a frontage of only 22 feet, yet the architectural treatment of the façade has secured for it a distinctive appearance and one that is entirely appropriate to the use to which the building is devoted. Beneath the iron balcony the wall surface separating the two groups of windows has been decorated by reproducing a series of printer's marks in colored tiles which harmonize with the red brick piers.

The pressroom is located in the basement below the street level, the presses thereby resting on a firm bed which reduces the vibration to the minimum. The bank of presses is well lighted from the light court skylight and from glass floor lights arranged before the windows in the story above.

The entrance at the right gives access to the office which is on the first floor level about nine steps above the curb. The entrance at the left is on a level with the sidewalk and gives on to a short corridor leading to the freight elevator. This arrangement provides a direct and convenient means of handling freight. The wall space between the entrances is used for a small display window, which is accessible from the office above through a trap door. The building is of slow burning construction and cost complete 12⅘ cents per cubic foot.

BIDDLE PRESS BUILDING, SOUTH SEVENTH STREET, PHILADELPHIA, PA.

BUNTING & SHRIGLEY, ARCHITECTS



FIRST PRIZE DESIGN

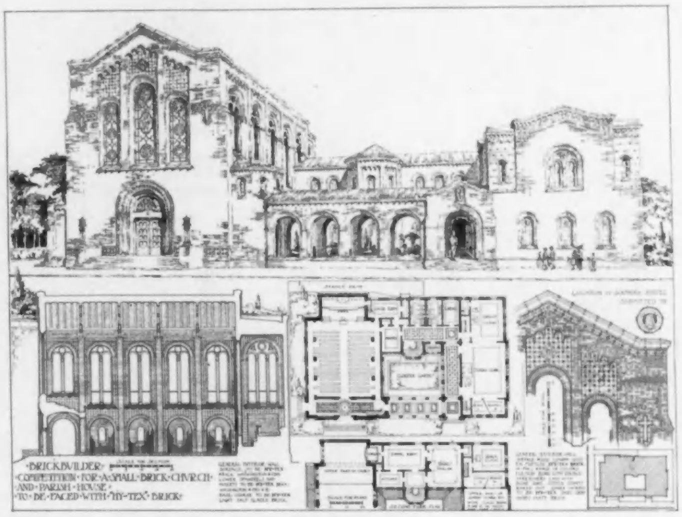
SUBMITTED BY MAURICE FEATHER, WATERTOWN, MASS.

Competition for a Small Brick Church and Parish House.

REPORT OF THE JURY OF AWARD.

THERE is nothing more promising for the future of architecture in this country than the results of such competitions as these. The prizes offered for designs for a small country church and parish house in brick brought a very large number of drawings (over 150), and among these over 50 which had the merit that one would expect to find only in the work of men of considerable experience. Yet most of them were submitted by young men. It is therefore encouraging for the future.

The most conspicuous quality in the four prize winners is not that they are well planned, nor that the design is pleasing and well rendered, but that they would build well, and in execution, would look probably better than as presented by the drawings.



Mention Design
Submitted by Francis P. Smith and J. Herbert Gailey, Atlanta, Ga.

That placed first is good in plan, well balanced and arranged, good in section, with a nice sense of proportion. The exterior is likewise good, quiet, and restrained. The whole is straightforward and churchly. The only adverse criticism might be that it does not seem the small country church of the program, but rather an important suburban one.

The second prize is awarded to a design which would certainly look better in execution than it does as presented. Indeed, if one grants the author the ability to detail well and oversee his modeling or sculpture, it would be an exceptionally interesting building. Moreover, it is distinctly the small church. The plan is one of somewhat imaginary balance, there being really but slight relation between the two masses. As the exterior shows a good eye for mass and ornament, so the section shows a good eye for proportion.

The third prize, like the first, is North Italian and is handled in a quiet and sure way that indicates good knowledge of the value of contrast in plain surface and ornament and of the accent of *chiaroscuro*. It is even less a small country church than number one, but it is a convincing piece of architecture.

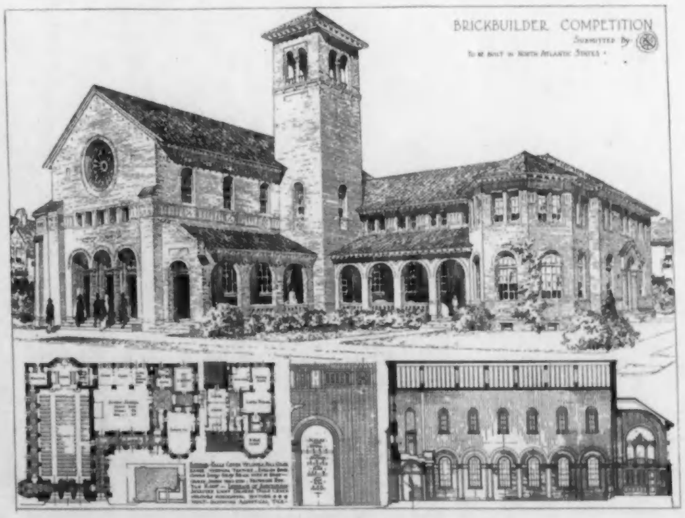
The fourth prize, like the second, has distinct individuality. The designers had a vision of familiar motives and composed and used them in a way to produce a charming originality. In the plan there is a balance between church and parish house equally apparent in plan and elevation, the whole making a delightful composition.

These four designs represent excellent and thoughtful work and are fully entitled to the prizes, and yet it is hard to draw the line sharply between these and the plans given mention, and between those mentioned and many of those not placed in the honor list. The six mention designs are presented as of equal merit.

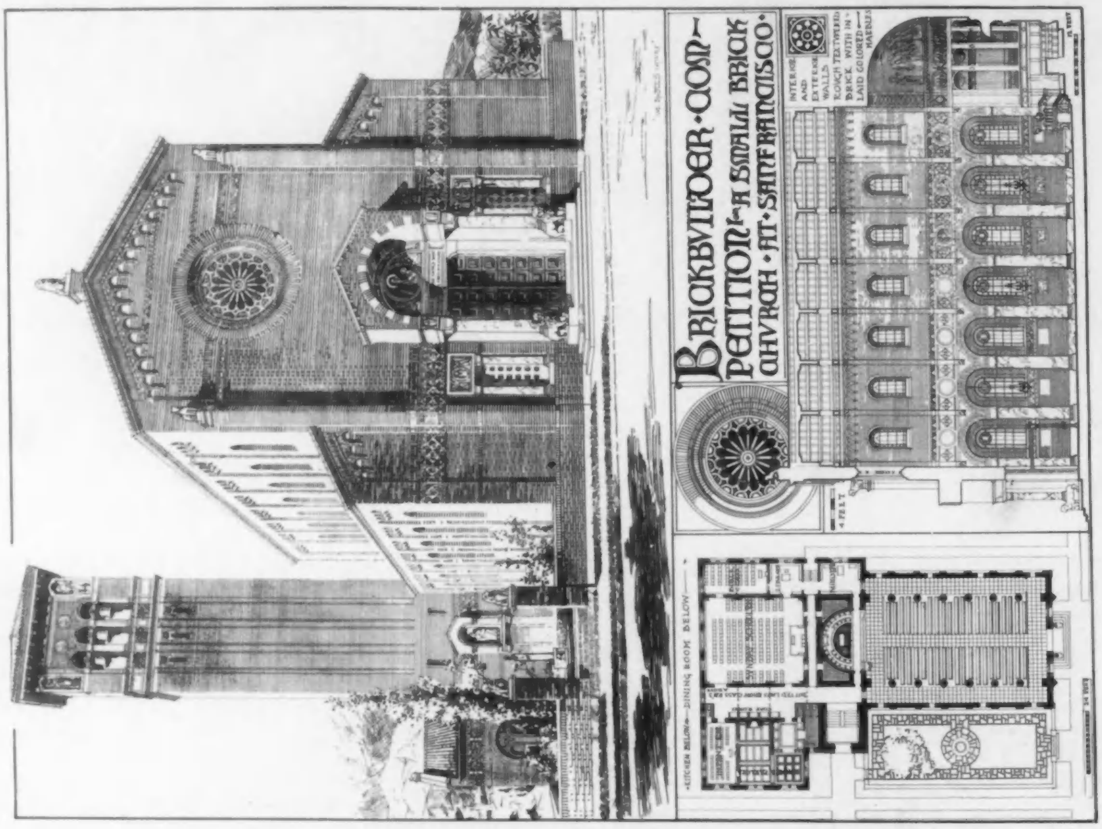
The design by F. P. Smith and J. H. Gailey is quiet, strong, and dignified, and the church, if it had been twice as long, would have had a very impressive interior.

The design submitted by R. W. Maust is really a small country church, and so simple and restrained as to appeal very strongly. It would look well in execution.

The design by Jerauld

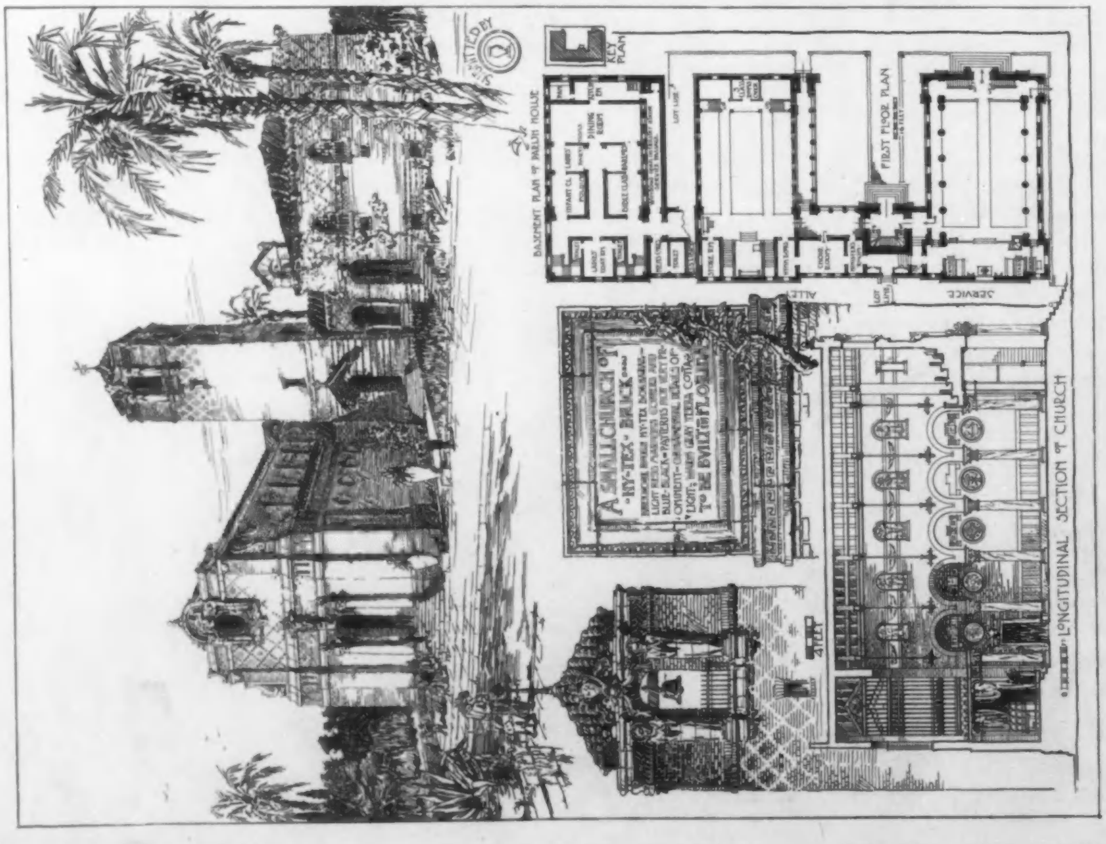


Mention Design
Submitted by Robert Wesley Maust, Wyoming, N. J.



THIRD PRIZE DESIGN

SUBMITTED BY ANTONIO DI NARDO AND CHARLES L. BOLTON, PHILADELPHIA, PA.



SECOND PRIZE DESIGN

SUBMITTED BY FREDERICK H. KENNEDY, BOSTON, MASS.

Dahler is simple and restrained, very distinctly the small church as far as its exterior is concerned; but the plan is somewhat pretentious for so small a scale, and the same thing applies to the great coffered vault of the interior.

The church by Davis, McGrath & Kiessling is full of good design within and without and indicates everything accomplished in a simple way with plain materials.

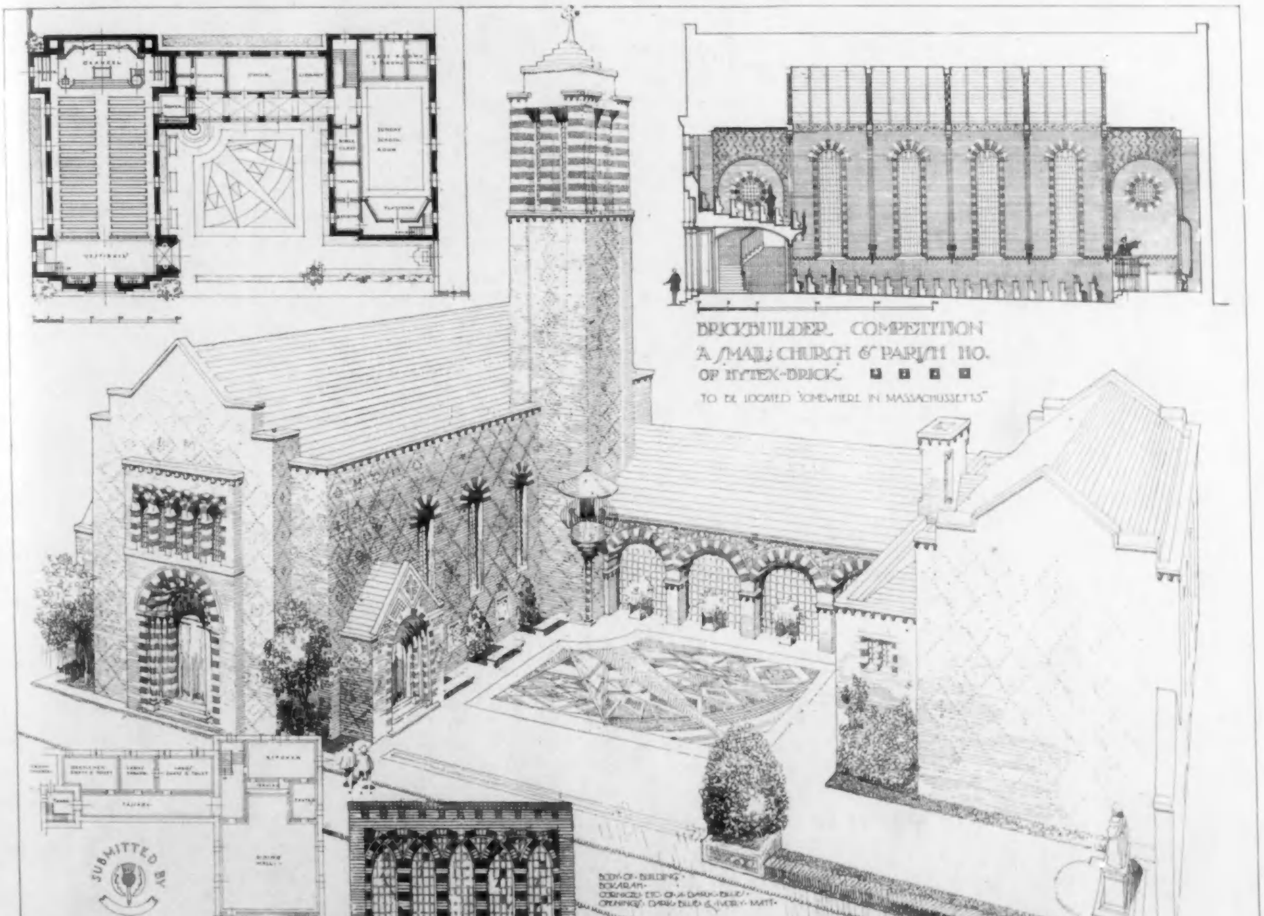
The design submitted by E. Donald Robb is one of the very few with a Gothic motive. Gothic and brick are not very closely associated in the minds of most of us, although Holland abounds in examples. The adaptation of brick to Gothic forms is well understood here.

The design by M. A. McClenahan is a freak, but a good freak; and if we could not play about at times and forget to be serious, none of us would do good work. A man who can design this is an able man.

It seems strange that hardly any one chose to follow simple New England, Philadelphia, or Virginia brick churches, and those who did handled the style with far less skill than those competitors who followed foreign types.

There were numerous others interesting for their idea, rendering, or other features, and one hates to pass them by without a word. Perhaps the best general word is that over and over again the jury said it wished it could detail and execute some of the designs; they were so good and needed only a little knowledge about execution to be fine. Those not mentioned may believe the jury said this about their design.

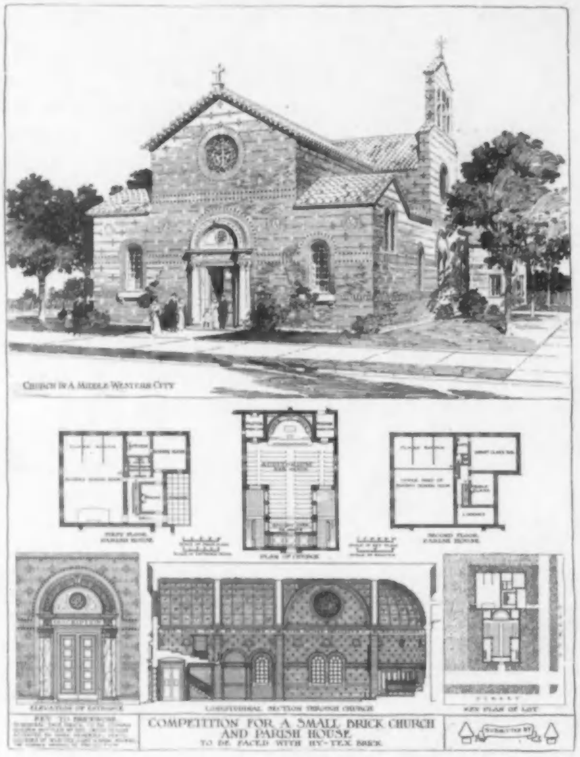
R. Clipston Sturgis, *Chairman*, Boston.
Thomas R. Kimball, Omaha.
Burt L. Fenner, New York.
John Lawrence Mauran, St. Louis.
C. Grant La Farge, New York.
Jury of Award.



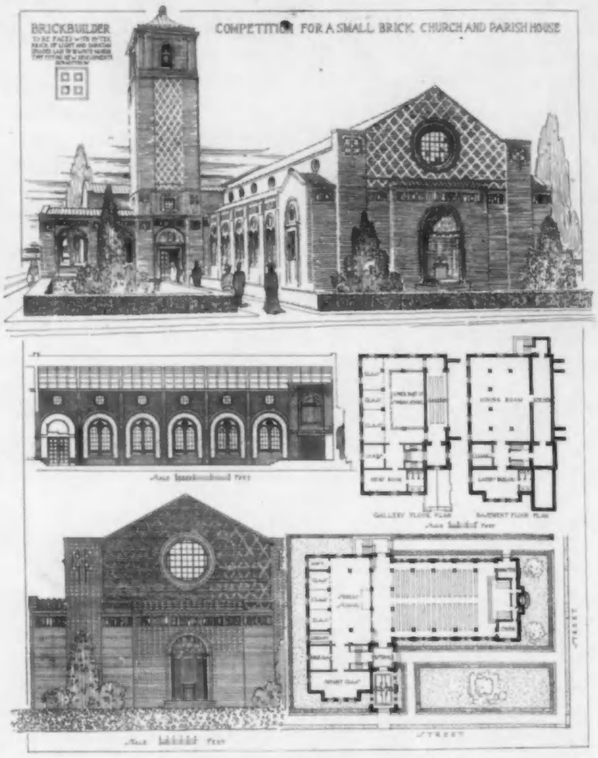
FOURTH PRIZE DESIGN

SUBMITTED BY H. J. VOSS AND A. F. LAW, BOSTON, MASS.

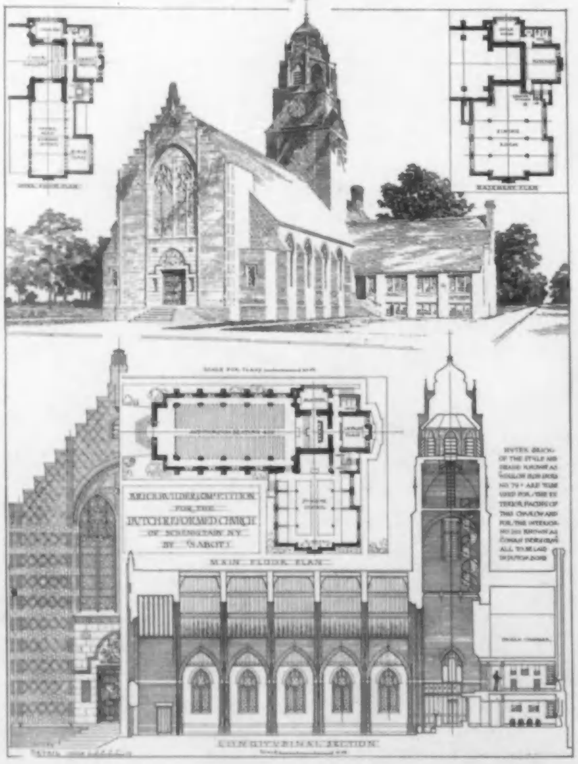
TAKEN



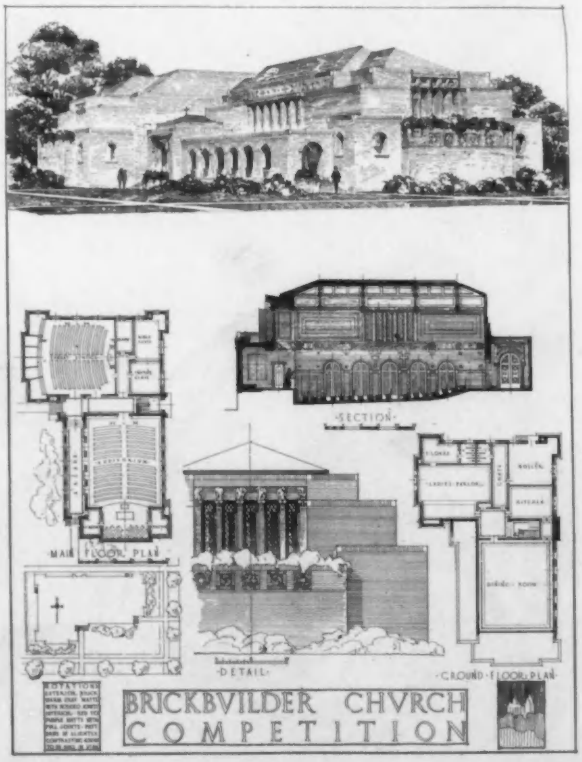
MENTION DESIGN
SUBMITTED BY JERAULD DAHLER, NEW YORK, N. Y.



MENTION DESIGN
SUBMITTED BY DAVIS, McGRATH & KIESSLING, NEW YORK, N. Y.



MENTION DESIGN
SUBMITTED BY E. DONALD ROBB, BOSTON, MASS.



MENTION DESIGN
SUBMITTED BY M. A. McCLENAHAN, SALT LAKE CITY, UTAH

EDITORIAL COMMENT AND NOTES FOR THE MONTH

A MIDDLE COURSE.

The following article is an expatiation upon the paper written by Mr. Claude Bragdon, entitled, "The Dead Hand in Architecture," which was published in THE BRICKBVILDER, *July, 1914. Although delayed in publication, it is hoped that its appearance now will recall Mr. Bragdon's paper and that it may elicit an equal degree of attention.* — EDITORS.

THE "dead hand" is clawing at our vitals! Mr. Claude Bragdon, through the agency of THE BRICKBVILDER for July, 1914, leaps into our sedate midst in a bold attempt to administer the strongest kind of castigation to a taoistic profession. Mr. Bragdon lays at the professional door the blame for greater sins of artistic omission than have ever appeared in the category of the most æsthetic saint. If there were a Universal Index of "unbuildable" buildings, we should all be homeless (and officeless) directly, for the pen would hesitate to write *ædificetur* upon the majority of modern designs.

Before the complacent practitioner has read one page of this rending attack by the author of the "Beautiful Necessity," he will hunt his cyclone cellar, wait in his benighted condition of retarded development, and — probably come up smiling. And there is the chief of his sins. If only he would come up in a chastened frame of mind, open to ambitions of growth; if only he would spread his wings and soar like a kite with well balanced tail. But his metaphoric tail is too heavy; it consists of the whole weight of unaltered and — so far as he is able to determine — unalterable tradition. He has looked so long upon one set of forms that he has come to regard them as his grandfather's clock, that must needs stand in his hallway because it has always stood there. In other words, he has stagnated his inventive faculty and is content to ride in the rut of irresponsible repetition, disregarding the many hands stretched out to aid him. Before Mr. Bragdon gets through, the modern architect has not a leg to stand on — in fact, he ought to be so contrite and humbly submissive as to be completely satisfied to sit down. But although Mr. Bragdon uses a sharp pen, he means merely to goad the architect, not to stab him. He does not consider his victim a good-for-nothing, but simply an amiable shirker of his high, moral duty. Let us follow the argument, expatiate upon its virtues, and, if we may be forgiven, attempt to rehabilitate somewhat the poor architect's blasted reputation.

We have man at the outset diligently working at the most apt expression of his day and age, producing ultimately what we choose to call a style, an imperceptible, unconscious growth sprung from an elemental human need, the product of careful hands under the guidance of conservative minds. Conservatism has nurtured this product until it becomes a hothouse plant, whose fruit is forced and rapidly decays. So finally the virtue becomes subject to the relativity which controls all things; it negates its own good effect. We have the algebraic process of the addition of a negative. But, it is alleged, the great number of architects are blindfolded by this conservatism and fully persuaded that they yet practise it as did Phidias of Athens. They do not see that they have been marooned; the current of life is fast sweeping by and their ship of progress is not of twentieth-century model. Instead of regarding precedent in the light of a handy tool, they consider it rather the food for their architectural souls. We would counsel them to cast away all forms that are old and that the world has called good in the past. On the contrary, we invite them to analyze all the past styles, select the fundamentals, imbibe the transcending or, in the broad sense of the word, *classic* elements, and eliminate those features which are distinctly personal to the individual period or age. That is the salvation of the modern style. As some one has aptly said, not to wear last year's hat again, not even to remodel it, but (gods of millinery protect us!) to dismantle last year's hat and to make a new one of the same materials. And it is in the materials that the whole secret lies.

The purpose of the past is to teach the present, and we candidly hope that our present will be tutor to an unsuspecting future. Pupils sometimes learn in spite of the teacher, but the lesson is not correctly presented; the maximum of benefit is not attained. How are we presenting ours? Have we a moral right to prepare for future generations a text-book of architectural practice that is but a regurgitation of centuries of improvement? The question is a broad one. If we have no right to profit by what others have done before us, if we must begin anew with tent and igloo and long-house, then the millennium will come too soon. On the other hand, if we draw reasonable inspiration from the past, if we carefully glean the secret of impersonal beauty and truth out of the works of our forbears, surely we will but carry along the torch. Is it not the noblest purpose of every time and style to carry along the torch? The flame, to be sure, is uniform, consisting of the sum of beauty and human good; but the fuel may, indeed must, be different with each hand that keeps it burning.

As in literature one manner gives place to another, Fielding to Dickens, Dickens to Locke; as in music a mode of tone arrangement supersedes its predecessor, even with the wide distinction of Wagner and Strauss, so it is in every field of human expression. The mental attitude is the basis, and by its very definition that basis must contain the roots of growth, it must be able to germinate. And, to put the question again, does our modern method in architecture give such promise?

We have advanced along every line; in response to the cry of the century, specialization has produced experts in every detail of building, appliances to meet even the remotest requirement, short methods, apparatus, time

savers, and efficiency to make building easy. What benefit has accrued to design as the architectural language of the time? Imitation, mimicry, masquerade, are weak words to define our lack of backbone. One age builds of stone and *builds* its design; we build of stern, structural material and put over it a mantle of design; nay, we even debase that mantle by wilfully imitating one material in another. Where is our courage and our conviction? We decry false jewels, but we make our buildings — the permanent record of our artistic sentiments — wear false façades, shells hiding the substance and strength which should rightly express our life.

Yes, the architect faces stupendous obstacles. His ideals are there, to be sure, but they must be relegated while the serious business of life receives attention. And what is this insistent business? It consists of the faultless calculation of a number of personal, firm, and dealer's profits, blighting hurry (the formal mode of progress of the day) and an obviously and helplessly ignorant public. But who has not such obstacles to surmount? And are they not so many gems in the final crown of success?

But to return to Mr. Bragdon. The "glamour of Paris and of precedent" has provided a graceful mode of evasion of one's responsibilities. The public was dumfounded by the momentous display of the great groups at Chicago in '93, the apotheosis of Paris, and has not yet recovered. But we believe it has recovered; and, what is more, we believe it is dissatisfied with the peddling of old trinkets. Let us enjoy Europe and profit by her success, it is our privilege; but let us have done with Europe as a present source of examples.

It will be admitted that most originality is half-brother to ignorance, volitional or crude, of historic precedent. Originality seeks freedom and, having once loosed its shackles, does not know what to do with its hands. Hence the many amorphous intrusions upon the dignified process of stylistic evolution. Of these we wash our hands, for they represent the opposite extreme to which the pendulum may swing.

The extreme has its greatest antidote in restraint, stylistic restraint, personal restraint. This, Mr. Bragdon believes, should be inculcated by the schools of the country. He at once accuses the schools of failing signally in their duty. But we can say with conviction that the teaching of architectural history must inexorably remain one of the fundamentals of the teaching of architecture. We further maintain that history is a vast storehouse of ideals, and that the teaching of architectural history brings out restraint as the dominant quality of the noble sequence of styles. The teaching of such history is lifeless unless this restraint is everywhere emphasized. Restraint is the measure of art, especially of the Mistress Art, as Mr. Blomfield has christened it. The "sedulous aping of the mere externals" is a salutary form of architectural play; it is likewise a necessary part of architectural training; without it there is no beginning except that of the aborigines. Unfortunately in most modern schools the teaching of history and the teaching of design are two alien departments. Were the actual precept ably elucidated, more frequently brought before the student over his board, the field of design would have a saner interpretation. Indeed, we see no wiser course for the tyro than the study of conventions. Your *nouveau* must not blow himself up like the frog in the story, feeling within him the incontinent spark that will set the river of art afire and convinced that he is the maker of the new style that shall express the twentieth century. He should not be permitted to quote Michelangelo as he stood before Brunelleschi's dome at Florence: "Like you I will not build," unless the apostrophe be edited to read: "Like you I *will* build, until I know better." That is what Michelangelo meant. That is what the schools teach; that is what they must teach under present conditions or cease to be schools. As student, the embryonic architect will never "know better"; but as a man among men in the harvest field of life he will have his opportunity. Let us not require of the schools that they teach any more than the simple history, theory, and principles. Let the individual himself temper his education with experience, for the value of maturity is in its corrective influence. Shades of Vignola forefend, if the schools begin to teach us "not to remember, but only to forget." Better far to sign over our artistic souls to the blackest arch-fiend of the *Art Nouveau* at once.

No, Mr. Bragdon, the schools are on the right track; the practitioners are on the wrong one. The schools give instruction in the professions on the basis of supply and demand, and seek to add to this a quantum of scholarliness and breadth and humanity. When the architects have made a beginning — the gray heads alone are eligible for the first — then the schools will leap to their assistance. But until then they must remain the stabilizing influence.

But wherein does the man in practice fail? Mr. Bragdon's scathing indictment covers the whole field of architectural morality. The architect fails to think in terms of his materials, of his place, of his time. Mr. Bragdon is frank in assuming the rôle of the iconoclast in his arraignment; but it is the virtue of the iconoclast that he turns the bright spotlight of observation upon the ikon he seeks to break, and so shows us how nearly it is hidden in the cobwebs of carelessness and neglect.

In the first count is included the unscrupulous substitution and interchange of materials, one doing duty for and openly simulating another. All materials have individual modes of asserting themselves. Let the architect but study them and handle them in terms of themselves. He cannot err. What is more, if he conscientiously persists in this course his clients' taste will rapidly improve and soon of itself require that the truth be told. If there are differences in the prices of materials, such honesty would have its own reward, for the cheaper material need not necessarily be inimical to good design. Notre Dame in terra cotta would be as edifying as the Woolworth Tower in wood. And so each material has its beauty, its grace, its color and texture, not to mention its varied practical advantages in durability and lightness, ease of manufacture, or constructive feasibility.

In the second count comes the accusation that climatic and environmental requirements are not squarely met. This truth is palpable. Yet how many are aware of it; how many have even seen the ludicrous features that characterize sun shaded structures in sunless places, buildings bedecked with ornamental appliqué that is out of sight because of distance or of the concealing blanket of city dirt; or, worse yet, gorgeous edifices resplendent with commercial "mosaic" and composed of cubby-holes

intended for the unwholesome habitat of *genus homo?*

It is in the third accusation that we must again ask Mr. Bragdon to go more slowly. The substance of it is that the architect uses forms too readily on the suggestion of the pattern-book, gathers them from the antique or the medieval, as may be required, without regard for significance or contemporary value, and that he has not the courage to develop forms expressing his own time. Mr. Bragdon has advised us in his book to "go to nature — the source of every kind of formal beauty." He will admit, we believe, that nature forms have not often appeared in the history of ornament without an inherent meaning, an allegoric or symbolic connection. This is the real reason for their continuance in many cases. The process of simplification, call it conventionalization, if you will, refines out types, and succeeding generations use types apart from their significance. It is recognized that in modern times, with plentiful libraries, newspapers, architectural periodicals and means of communication, motives no longer need such intimate significance to imbue them with life. They do not need to be dry and uninteresting as a consequence, and where necessary a proper meaning may yet be given them. The fact that a lion's head was used in the past does not render invalid the use of a lion's head in the architecture of the present. That point of view seems to indicate more of an iconoclastic tendency than Mr. Bragdon himself would confess. Let us go to nature, then, and avoid the lion now under the ban and choose the head of the buffalo. It will not be difficult to concede this step; it is reasonable, national, and modern. But we cannot yet see other thoroughly modern and national items, such as compressed air riveters, taking their places as duly representative motives in design. We feel assured that certain type forms will persist; it is a phenomenon of ornament that this should be so. Perhaps, also, they are a gentle reminder of the greatness that has gone before, and may even serve to teach us that the germ cannot sprout entirely apart from all external influences, for the seed needs water.

And here we end our species of counter-reformation. We are heartily on the side of Mr. Bragdon in his missionary work — would that every member of the profession had his courage. And the great army of American builders of the beautiful needs something more than a curtain lecture. Yet we honestly feel that the "dead hand" is harmless; that it is, indeed, dead, and that it dwells among us as a valued relic. Architects will get rid of it soon enough, but not until they have a better substitute. At any rate, let us hope that, though the hand be dead, the arm is yet alive and sinewy; that the body is in tune with the time, full of strength, ambition, and promise. —

RICHARD FRANZ BACH,
Curator, School of Architecture, Columbia University.

THE month of May presents a comparatively favorable showing in the building industry. Permits were issued in 71 cities during the month for construction work aggregating over $70,000,000. This exceeds the total for April, which was $64,652,631. As compared with the corresponding months of 1914, both April and May are almost on an even basis. There was in April a decrease of 1 per cent; in May of 2 per cent; but during the first three months of the year there was a much more marked shrinkage as compared with the first quarter of 1914. New York makes a better showing in May than it made in April, its May gains amounting to 50 per cent. Chicago also, in spite of its labor complications, shows a comparative gain of 14 per cent.

The official building permits issued by the 71 cities during May, as received by the American Contractor, New York, total $70,273,533, as compared with $72,057,-666 for May, 1914. Of these 71 cities 22 make gains, the more notable instances of activity including, in addition to New York and Chicago, the following; Cleveland, a gain of 134 per cent; Denver, 99 per cent; Harrisburg, 152; Lincoln, 224; Hartford, 61; New Orleans, 46; Oklahoma, 49; St. Joseph, 76; Sioux City, 59; and Wilkes-Barre, 177.

MANY architects will undoubtedly be interested in the meeting of the American School Hygiene Association, which is to be held in San Francisco, June 25 and 26, under the patronage of the Panama-Pacific International Exposition. The educational exhibit of the exposition is itself very comprehensive and it is planned to supplement this with an exhibit of the most progressive and hygienic types among the schools of California.

This will be the eighth congress of the National Association, last year's meeting having been postponed on account of the war. The Congress of 1913, it will be recalled, was merged into the Fourth International Congress on School Hygiene, very successfully held at Buffalo, and it is to be expected that the papers in this present meeting will have the same great practical value as those that appear in the proceedings of former congresses.

It is hoped to place the importance of the hygiene movement as represented in this Congress of the American School Hygiene Association strongly before all those who are responsible for health conditions in our public schools. Among these responsible people there are perhaps none that are more influential than the architects of the country. Any architect who has even the remotest interest in schools can derive substantial benefit from membership in this Congress and in studying its proceedings, whether expecting to attend or not. The membership fee is $3, which should be sent to Dr. Wm. Palmer Lucas, Secretary-Treasurer, University Hospital, San Francisco. This gives full membership in the Association for one year, including a copy of the printed proceedings.

PLATE DESCRIPTION.

HOUSE OF CHARLES PAXTON, ESQ., LAKE FOREST, ILL. PLATES 76–78. This house is veneered with a medium textured brick laid up with gray mortar joints and trimmed with Bedford stone. The roofs are covered with stained cedar shingles. The outside finish is white pine, painted, with the exception of entrance doors and frames, which are of white oak.

The interior is finished in whitewood enameled throughout except the main hall and stairs, which are of white oak, stained and varnished rubbed, and the service portion, which is finished natural.

All plumbing is of modern type with vitreous china lavatories, enameled iron tubs, and sinks and syphon jet closets. The house is heated with steam and the boiler

is provided with an auxiliary coil for heating water for the domestic supply in addition to the small hot water heater. A vacuum-cleaning system is also installed.

House of E. D. Speck, Esq., Grosse Point, Mich. Plates 79-81. This house is located at Grosse Point Shores, about twelve miles from the center of Detroit. The property has a frontage on Lake St. Clair of 600 feet and a depth of 8,000 feet. The place was planted about twenty-five years ago by the older Olmstead and has beautiful trees and shrubbery. The approach to the house is from the northwest and the carriage entrance is on that side. The terrace front faces southeast.

The first story of the house is built of brick laid with wide flush joints with buff stone trimmings. The second floor timber work is of oak of rather a grayish brown color, with rough plaster panels, colored grayish cream. The roof is of red tile laid random edge and not selected for color. The main hall, which extends through the house, is finished in English oak of a grayish brown color, paneled from floor to ceiling. The hangings are tuscan red with a Sharistan rug in the same predominating color. The drawing room is paneled in French gray and has a decorated ceiling. Hangings and rugs are a light mauve color. The dining room is paneled in English oak of a grayish brown color, the ceiling is decorated in cream white, and the hangings and rugs are gray-blue and gold. The living room is also finished in English oak with the walls above the wainscot covered with gray-green plush, the hangings being of a darker green velour trimmed with old gold. Adjoining the living room is the den finished in gum wood, gray-brown in color. A small loggia opens from this room, which gives a vista of the rose garden to the northwest. To the southwest of the living room is the sun room finished with brick walls, timbered ceiling, and a tile floor. This room leads to the sunken garden to the southwest with its pergola and pools.

The construction is fireproof throughout, and all modern equipments have been provided, including refrigerating, sweeping, and water softening plants, indirect hot water heating with thermostat control, and a push button electric elevator.

The second floor is finished in ivory white with mahogany doors and trim. The service portion is entirely in the wing of the third floor.

First Church of Christ, Scientist, Los Angeles, Cal. Plates 86-88. An unusually shaped lot is partly responsible for the unique plan and unusual exterior of this church. The sloping condition of the site has been taken advantage of by placing the Sunday-school room with its entrance at the low end.

The main entrance to the auditorium is at the point of intersection of the streets. This plan enabled the foyer and auditorium to be placed on the same level and but a few steps above the grade of Alvarado street. The main auditorium is 95 by 91 feet in size and seats 1,125 persons. Over the foyer is a balcony easily reached by two flights of stairs, seating 175 additional persons, making a total seating capacity of 1,300 people. One of the features of the auditorium are two large alcoves on either side raised about 3 feet above the level of the auditorium floor, like the loges of a theater. One of these loges has two sets of entrance doors opening on a spacious arcaded porch on the south side of the building, which with its adjoining waiting room provides a pleasant place for persons who have brought children to Sunday-school to wait while it is in session. The ceiling of the auditorium is coffered to increase its acoustic properties, and for the same reason the side walls were lined with felt instead of being plastered and a high wooden wainscoting placed around the auditorium. The rostrum and readers' desks are arranged in the way usual to Christian Science churches. The organ console has been sunk into the floor of the auditorium immediately in front of the rostrum so that the organist would hear the sounds from the organ in approximately the same way that the congregation would.

The entire basement of the building below the main auditorium floor has been excavated. The major portion of the basement has been taken up with a large Sunday-school room which receives an abundance of light and air and comfortably seats 900 people.

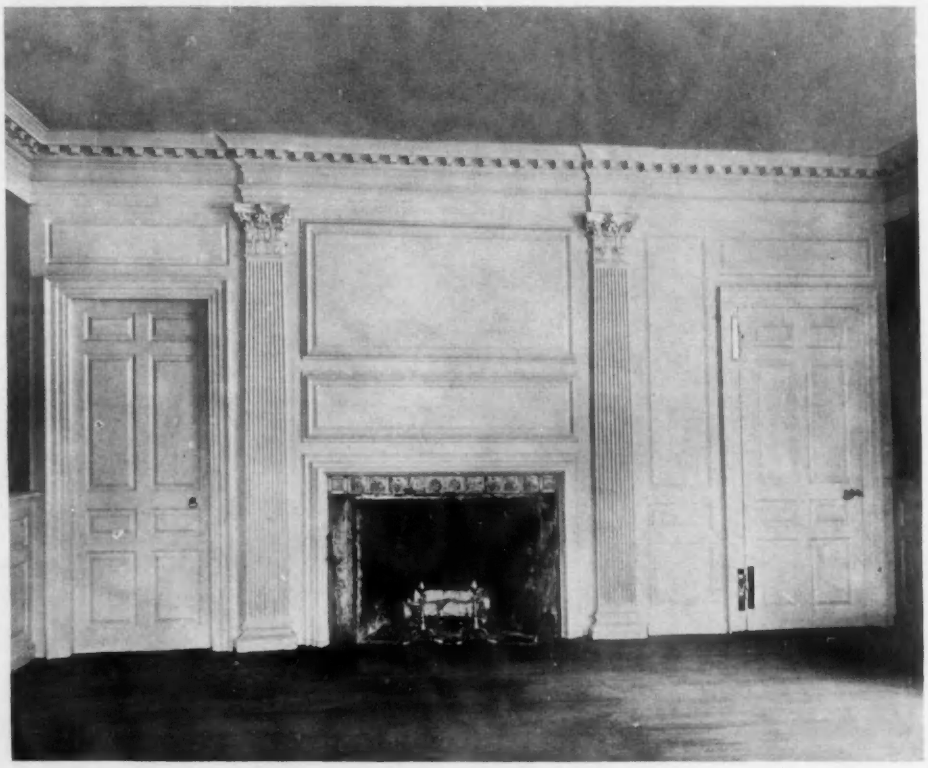
The building has solid brick walls with a gray brick facing laid up in Flemish bond with darker headers. The roof is covered with red mission tile.

First Church of Christ, Scientist, Worcester, Mass. Plates 89, 90. This church is constructed of brick, faced with golden bricks in three light shades, laid at random as to color. The bonding is done with flush headers every fourth course. The pediment and columns and other trimmings are terra cotta of a light buff color, which blends in pleasing effect with the brick.

The heating system is low pressure steam, with direct-indirect and direct radiation. The ventilation of the auditorium is effected with a gravity system during the winter months and in summer through an open dentil course in the ceiling light, fresh air being admitted through the ventilating box bases of the direct-indirect radiators. A steam coil is installed in a space above the ceiling light to keep the sunlight above clear from snow and ice. A sufficient velocity is secured by the heat from this coil to ventilate the upper part of the auditorium. The auditorium, which seats 450 people, was designed without windows, the lighting arrangement being an adaptation of a principle of the ancient temples to modern usage. Light is admitted through the ceiling and has proved to be a very successful method, as may be judged from the illustrations of the interior. The ceiling light is glazed with acid treated rippled glass, and the skylight with wired hammered glass. The diffusion of light is very good. Artificial light also is admitted to the auditorium through this ceiling light, there being installed between the ceiling light and skylight fifty-four 100-watt tungsten lamps, with a 12-inch cone-shaped mirror reflector over each lamp. The ceiling pans shown under the balcony are installed to relieve the shadows caused by the projections and not for necessary illumination.

While the omission of windows was primarily a matter of design, it also fulfilled a requirement of the building committee that the congregation in the auditorium should not be disturbed by noises caused by traffic in the streets. The omission of windows might be thought to give the auditorium an oppressive atmosphere which would react upon the imagination of the congregation; but, to the contrary, it has made the building more comfortable and, in addition, ensures it being cool during the hottest summer months.

THE BRICKBVILDER COLLECTION
EARLY AMERICAN ARCHITECTURAL DETAILS



THIS is a most interesting example of the eighteenth century type of drawing room in which the fireplace end is paneled to the ceiling. The pilasters, with a slight entasis and beautifully carved capitals, frame the heavily moulded panels, which are made of single pieces of wood in an effective manner. It is claimed that the interior woodwork in this house was made in England. The fireplace facing is of Dutch pictorial titles in black and white.

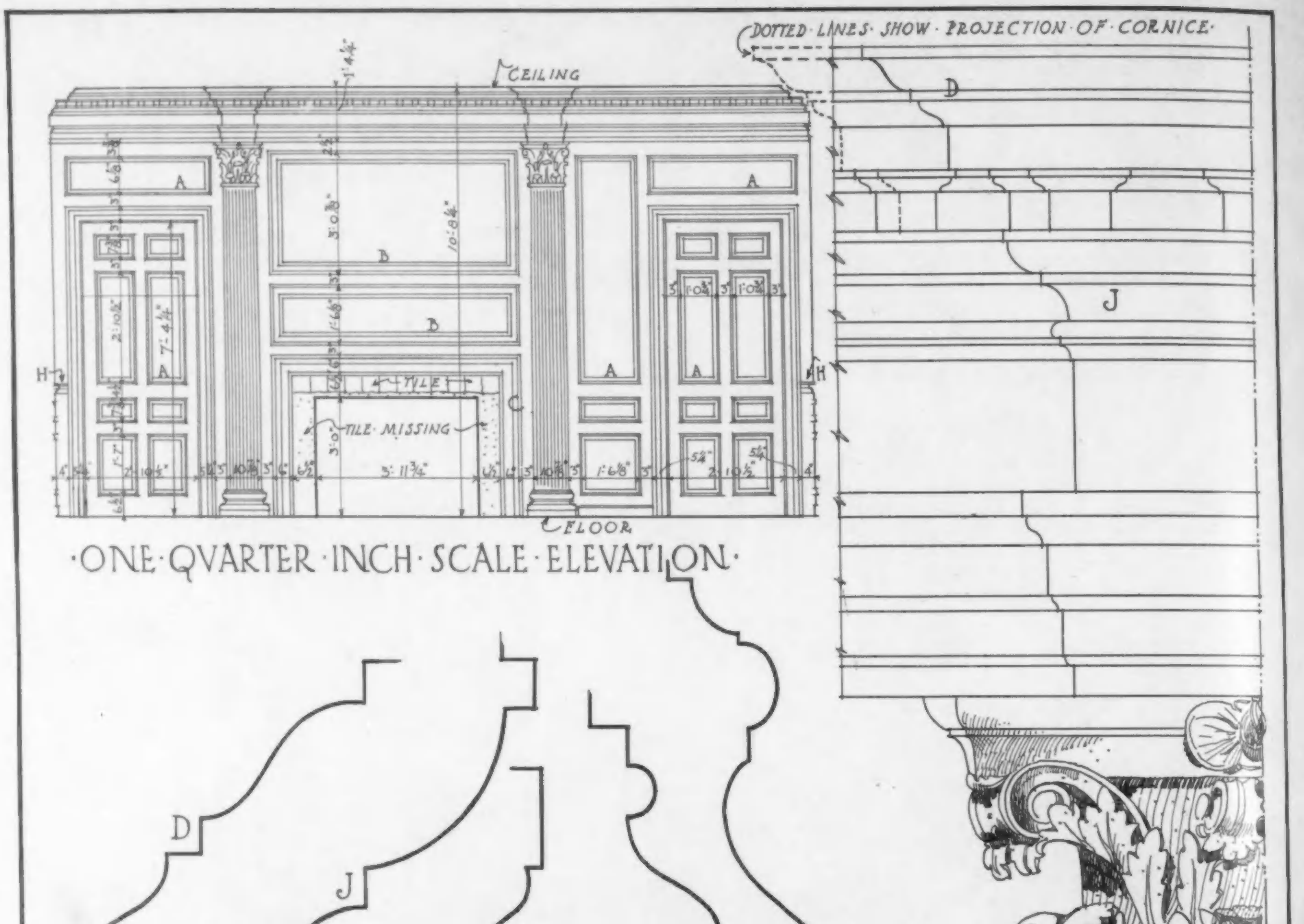
MANTEL END OF PARLOR, "THE LEE MANSION," MARBLEHEAD, MASS.
BUILT IN 1768

MEASURED AND DRAWN BY

GORDON ROBB & M. A. DYER

Plate Seven

(over)



PLATE· 7 JVLY· 1915	·WOODWORK·IN·PARLOR·OF· ·LEE·MANSION·AT·MARBLEHEAD· BVILT·IN·1768· ·MASS·	·MEASVRED· & ·DRAWN·BY· ·GORDON·ROBB· ·&·M·A·DYER·

PALACE OF THE MAYORALGO FAMILY, ESTREMADURA, SPAIN

ERECTED ABOUT 1400